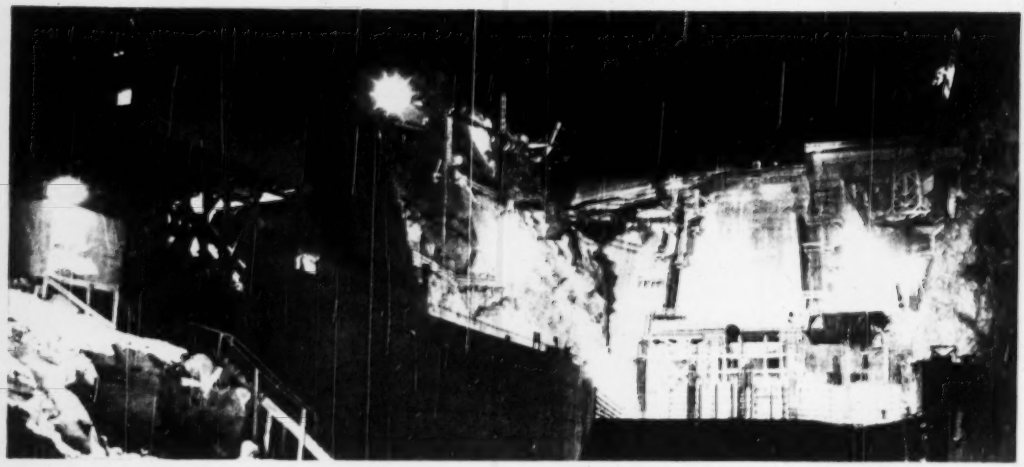
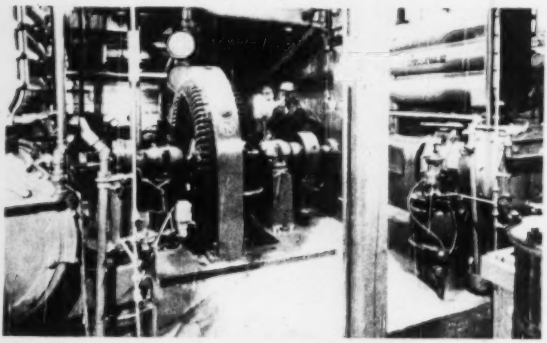
ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION

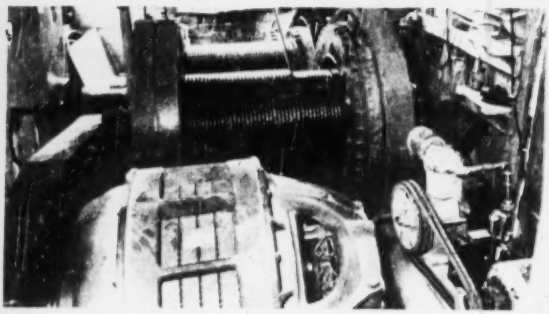


speeding construction at Kortes Dam

... Electrically



All air pressure for job comes from compressors driven by a 500-hp G-E motor.



The 185-foot boom hoist is driven by a 200-hp General Electric induction motor.

G-E Equipment Operates Around the Clock to Meet Schedule

To maintain their rigorous work schedule at the Bureau of Reclamation's Missouri Basin Kortes Dam project, Kortes, Wyoming, Morrison-Knudsen Co., contractors, must keep on the job 24 hours a day. Thanks to modern machinery *electrified by General Electric*, work proceeds at this accelerated pace without the periodic shutdowns usually expected in this kind of job.

When you electrify with G-E motors and control supplied from G-E power distribution systems, you get safer, faster, more efficient operation. You'll also have the added advantage of engineering assistance in application, installation, and service, regardless of job location. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

Whether you buy or build construction equipment, your G-E representative can show you how to do a better job at lower cost—by complete electrification. Write him now, and he'll call on you at your convenience.

Electrified Construction
BETTER PRODUCT
LOWER COST

GENERAL ELECTRIC

TIE RODS

. . . made from new billet steel

. . . threaded to any standard or special requirement

. . . rolled threads in diameters up to $1\frac{1}{2}$ in., any length

. . . cut threads in diameters up to $4\frac{1}{2}$ in., any length

. . . straight or bent, single or multiple units, asphaltum-dipped or hot dip galvanized

. . . furnished with full line of accessories, to meet every requirement

BETHLEHEM STEEL

Tie Rods are a product of Bethlehem's Lebanon, Pa., plant

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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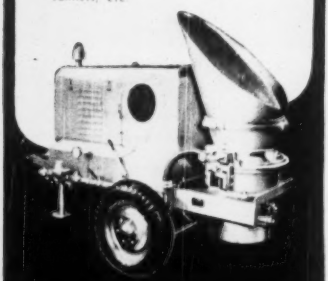
MONEY MAKER

JETCRETE GUN

•SHOOTS STRONGEST CONCRETE FASTER

"Welding with Concrete" best describes the new CMC JETCRETE method of pneumatically applying concrete. JETCRETE is *the most nearly perfect concrete known today.* Wherever and whenever used, JETCRETE has done the job better, faster —and at lower cost! The machine with a thousand uses!

- *BUILDING* walls, roofs, partitions, fences, fire retards, etc.
- *REPAIRING* Distintegration of all kinds—old buildings, bridges, stacks, bunkers, dams, etc.
- *WATERPROOFING* Reservoirs, tunnels, tanks, drains, fissures, water basins, etc.
- *FIREPROOFING* Wood, structural steel buildings and mines, etc.
- *PRESERVING* Brick, concrete, steel, tile, stucco, wood, iron, spillways, turbine chambers, piers, sewers, tunnels, etc.



Write for illustrated bulletin No. JO-348 showing JETCRETE in action.

CONSTRUCTION MACHINERY COMPANIES
WATERLOO, IOWA

ENGINEERING NEWS-RECORD

Volume 144 MAY 18, 1950 No. 20

WALDO G. BOWMAN
Editor

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"Caterpillar" Hydraulic Controls

Use VICKERS BALANCED VANE PUMPS

Caterpillar No. 46 and No. 44 Hydraulic Controls use Vickers Balanced Vane Type Pumps for their dependable source of hydraulic power. These front mounted controls have a world-wide reputation for responsiveness, reliability, low maintenance and minimum down-time.

Vickers Vane Pumps have many advantages in addition to the hydraulic balance and cartridge assembly illustrated below. Their initial high operating efficiency continues because correct running clearances are automatically maintained. The no-load starting characteristic is an important feature in cold weather. Space requirement is small in proportion to hydraulic output. Working pressure is up to 1000 psi (continuous duty). Write for Bulletin 36-12 and Bulletin 49-52, which illustrate and describe the advantages of Vickers Vane Pumps for mobile equipment.

TO HELP ASSURE:

Fast, Responsive Control

•

Long, Reliable Service

•

Minimum Maintenance and Down-Time

•

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DIVISION OF THE SPERRY CORP.

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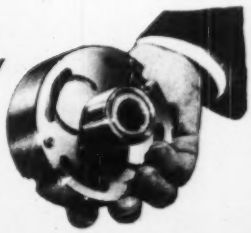
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

3984

VICKERS

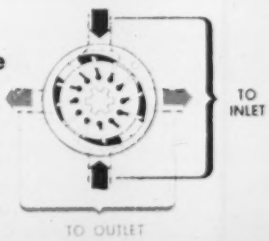
Cartridge Assembly



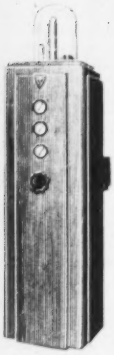
This cartridge contains all the pumping parts that move . . . none of them contact the housing. Inspection and removal of all working parts can be made without disconnecting piping or drive coupling.

VICKERS

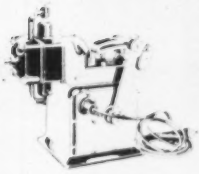
Hydraulic Balance



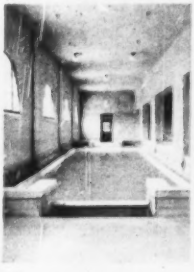
With this patented construction, bearing loads are cancelled out by equal and opposing radial hydraulic thrust loads as shown in diagram. The result is longer pump life with minimum maintenance.



CHLORINATION by W & T



...Protects them all



R[illegible] chlorination by Wallace & Tiernan [illegible] pool. For [illegible] operation, health officials and municipal engineers know from years of practical experience that the Wallace & Tiernan combination of a full line of equipment to meet every requirement is backed with nation-wide field organization, [illegible] by extensive production facilities, and an able research department [illegible] chlorination performance in every type of pool.

The following equipment is typical of the quality and variety that Wallace & Tiernan's 50 years experience has made available:

FOR INDOOR POOLS [illegible]

FOR OUTDOOR POOLS [illegible]

CHEMICAL FEEDERS [illegible]

[illegible]

SP-105

WALLACE & TIERNAN
COMPANY, INC.
CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

...Cut Down "TRUCK ABSENTEEISM"

put MACK TRUCKS on your job

"Truck Absenteeism," like its human counterpart, disrupts the efficiency of your business . . . adds materially to your costs. Actual job records prove that with Mack trucks on the job "truck absenteeism" is reduced to an absolute minimum. That's because Mack trucks have built-in durability . . . extra reserves of strength and stamina. Because they're better built, they're better able to stand up to the demands of hard-working, day-in, day-out service. Work done on the job will always be the one true yardstick of truck value. Figured that way, every Mack truck gives full measure — and more — in round-the-clock dependability; longer, more trouble-free mileage life; sustained earning power; and rock-bottom maintenance costs. On the job — and on the job records — it proves out every time: "YOU GET MORE WORK *OUT* OF MACK TRUCKS, BECAUSE MORE WORK GOES *INTO* MACK TRUCKS."

Be Profit-Wise

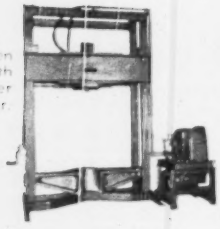
Modernize with

Mack

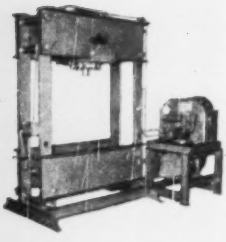
...outlasts them all!

8261

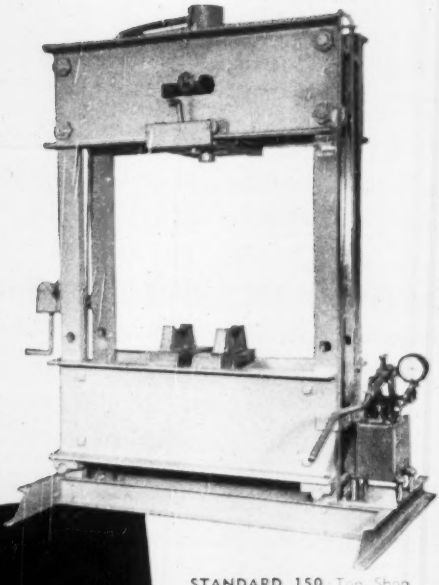
Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



SPECIAL 150 Ton Open Yoke Vertical Press with adjustable head member and double-acting cylinder.



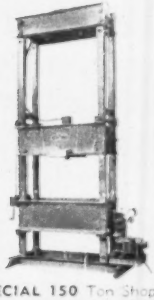
STANDARD 200 Ton Shop Press with 4-Cylinder Power Pump and double-acting cylinder.



...THE FINEST PRESSES FOR THOSE 101 SHOP JOBS

Rodgers
100, 150 AND 200 TON SHOP PRESSES

STANDARD 150 Ton Shop Press with new Rodgers 4-Speed Hand Pump capable of producing 10,000 psi maximum pressure.



SPECIAL 150 Ton Shop Press featuring a 96" opening with adjustable head and bolster.

Fast, Versatile Hydraulic Presses With Hand or Power-Driven Pumps

HERE are versatile, time-saving presses you can use in a hundred ways — the Rodgers 100, 150 and 200 Ton Hydraulic Shop Presses, operated with your choice of the new 4-speed Hand Pump or Power Pump.

The standard 100, 150 and 200 Ton Units include many construction and operating features — the cylinder is movable across entire width of upper head member — Two-way Travel Cylinders can be used when necessary to return heavy dies — Sturdy Press Frame permits full pressure to be applied anywhere across 48" width of lower bolster — Bolster adjusts from 12" to 56" — and there are open ends between uprights to accommodate long material extending through.

If specifications on the standard models don't meet your requirements, we'll modify them or build a special press as required.

There are standard model Rodgers Shop Presses in 60, 80, 100, 150, 200, 300 and 400 Ton Capacities!

SEND FOR CATALOG...

New Catalog 313 has descriptions and specifications on the complete line of shop presses.

HYDRAULICS KEEP THE WORLD MOVING

Rodgers Hydraulic, Inc.

7441 WALKER ST., ST. LOUIS PARK, MINNEAPOLIS, MINN. "HYDRAULIC POWER EQUIPMENT"

Euclid... Specialist

IN

OFF-THE-HIGHWAY HAULING EQUIPMENT

Built by a pioneer manufacturer of earth moving equipment, Euclids incorporate the know-how of years of experience. Every Euclid model is engineered specifically for off-the-highway work; all of the production and service facilities of Euclid are devoted to this type of equipment.

Heavy-duty design and construction throughout assure long life and dependable performance . . . more loads per hour and more profit per load on the toughest jobs. Some of the Euclid-built features are the planetary type drive axle, frame and body on all models, and double-acting hydraulic hoist for Rear-Dump and Side-Dump "Eucs".

Owners can depend on Euclid's world-wide distributor organization for parts and service when and where they are needed. Call or write your Euclid Distributor for complete information on models best suited for your job requirements.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

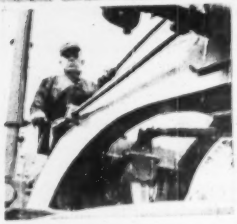
CABLE ADDRESS: YUKLID—CODE: BENTLEY

EUCLIDS *Move the Earth*

Easy does it – with ADAMS

1 Positive Mechanical Control System Provides Fast, Accurate Blade Adjustments.

2 Push-Button Starting From Cab — Assures Quick, Easy Starting In All Weather.

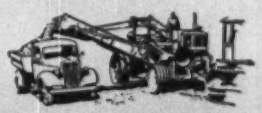


3 Good Visibility Gives Operator Always Clear View of Blade and Work.

4 Efficient Steering Gear and Improved Front Axle Design Makes Steering Easy.

Easy operation in a motor grader involves both ease of physical effort and ability of operator to get blade adjustments wanted—quickly, positively—and then being able clearly to see work in progress. That's why the easy operating advantages of Adams Motor Graders (as shown above) are so important. Other advanced Adams features include generous blade clearances—high-arch front axle—convenient control levers—standing or seated operation. For complete information, see your local Adams dealer.

Adams



MOTOR GRADERS • LEANING WHEEL GRADERS • ELEVATING GRADERS

NEWS BRIEFS

Ohio Goes Ahead—Economic and engineering surveys of the proposed Ohio Turnpike have been okd by Governor Lausche. He'd been blocking them since late March, when the state Supreme Court okd a loan of about $600,000 to the Ohio Turnpike Commission by the state highway department to finance the studies. Lausche was disturbed by prospects that the act would be ruled unconstitutional, even though the loan wasn't. Highway Director T. F. Kinzer said he will proceed immediately with the search for a qualified engineering firm to do the surveys.

Wanted: Six Bus Stations—British Columbia Electric Co. subsidiaries will build six bus stations in the Fraser Valley, B. C., this year and next. Scheduled to be built this year are depots at Chilliwack, Mission and Cloverdale. For 1951 construction are three at Abbotsford, Langley Prairie and Huney.

Not Like Johnstown—That story about the dam breaking above Crookston, Minn., and sending a "wall of water" toward the city, forcing 200 or more people to flee their homes was a little overdrawn. Some flashboards broke on a small, rock-filled crib dam of the Northern States Power Co. But the dam didn't break and the water which passed over never reached Crookston. Repair cost: About $600.

Power on the Way—Pacific Northwest power users were cheered recently when work began on the foundations for the power plant at Hungry Horse Dam, in western Montana. Scheduled to begin operation in December, 1953, the Hungry Horse capacity, 420,000 hp, will be the first major block of capacity to go onto the lines of the hard-pressed Northwest Power Pool.

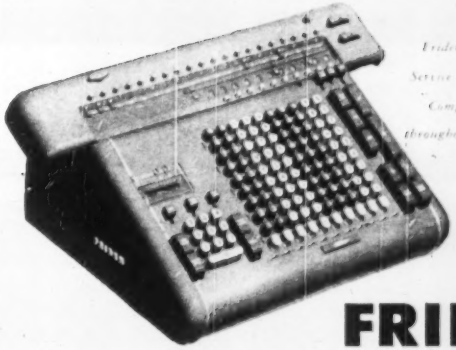
Some Swimming Pool—Massachusetts Gov. Paul Dever has announced plans of the Metropolitan District Commission to construct dikes which would landlock Pleasure Bay, off South Boston. Erected between the Head House Pier and Castle Island, the dikes would be of solid fill, with tide gates to permit a change of water. On completion, thousands could swim there at any stage of the tide.

Now They Can Use It—Structural changes have been completed in Hollywood's Country Club hotel and a certificate of occupancy has been is-

(Continued on page 10)

Double Checking Answers ... Wastes Money

What does it cost *you*...to double check needlessly the answers to your figure-work problems? Any duplication of work wastes time and operator effort. The NEW FRIDEN gives you *visual proof of accuracy* when you enter your problem; and again when the accurate answer appears in the dials. Yes, due to the *ultra-matic performance* of this new calculator...you make worthwhile savings...no double checking, no refiguring for proof. Your local Friden representative will be pleased to show you how *accurate answers* to all types of figure-work problems are obtained by a simple, *single* operation. Why not make comparisons in your own office, on your own work? Learn...that when you FRIDENIZE you ECONOMIZE. Stop *wasteful double checking answers!*



Friden Mechanical and Instructional Service is available in approximately 250 Company Controlled Sales Agencies throughout the United States and Canada

FRIDEN

CALCULATING MACHINE CO., INC.

HOME OFFICE AND PLANT: SAN LEANDRO, CALIFORNIA • SALES AND SERVICE THROUGHOUT THE WORLD

DRIVE-IT

..saved us 85% in fastening costs!"

Users actually bubble over with enthusiasm for the performance of DRIVE-IT powder-actuated fastening tools. One of them started a letter to us the same way we headlined this ad . . . "Hurrah and congratulations for selling us your DRIVE-IT tool!"

And that letter is no exception. Hundreds of contractors, builders, and sheet metal men praise the efficiency of DRIVE-IT for faster, *safer* fastening of steel or wood to concrete or steel.

Get the *facts* on the new DRIVE-IT "300" and you, too, will say "hurrah"!

DRIVE-IT "300"

Distributors Coast to Coast

POWDER POWER TOOL CORPORATION

0703 S. W. Woods St., Portland 1, Oregon

(Canadian Distributor) Ammo Power Tool Co., Ltd.
Foot of McLean Drive, Vancouver, B. C.

Check these exclusive features of the . .

DRIVE-IT "300"

- Controlled power with one power charge
- Positive, 3-way safety
- Uses flangeless drive-pins
- Permanent, adjustable safety pad
- Semi-silent operation
- Automatic extension barrel

You bet I'm interested . . .
Send me the story!

NAME

COMPANY

STREET AND NO.

CITY AND STATE

POWDER POWER TOOL CORPORATION 0703 S. W. WOODS STREET PORTLAND 1 OREGON

(Continued from page 9)

sued after almost three months of legal fireworks. The dispute involved a municipal judge, who ordered the structure closed and told council members they had the right to push it over with bulldozers; the state association of architects, which suggested that the judge stick to his torts after he described the structure as "that architectural monstrosity," and the owners, who were sentenced to long jail terms and fined $5,000 for operating a hotel without a permit and violating building codes. The structure is described, as others are, as the "world's largest all-welded building of its type."

Canadian Code Coming—A Canadian National Research Council committee working on a National Building Code has been instructed to proceed immediately with final preparation of a small code for residential construction. The new document is to be based on the existing national code, issued in 1941. When finally approved by the committee, the new national code will provide a framework for continuous revision of the code, and such revision will take place steadily. Representatives of nine of 10 provinces and all major cities met with the committee recently to discuss regulations and progress of the code writing.

THE COVER

W. Victor Weir, who will be seated next week as president of the American Water Works Association, is a man whose double jobs reinforce his reputation as one of the "future-minded" men of his industry.

He's president and general manager of the St. Louis County Water Co., (supplying 80 municipalities), and president and general manager of the Missouri Water Co. (supplying Lexington and Independence).

His reputation among waterworks men is based on his ability to set up and operate maintenance procedures that keep his water systems operating at peak efficiency, with little time loss for accidents. In the words of one admirer, "He's not a man to wait 'till the hydrant bursts before looking to see if there's anything the matter with it."

The U. S. Army made use of this talent, setting Weir to the wartime task of developing its maintenance manual for use at all installations during the war.

Now 48, Weir is a graduate of Washington University, 1923, and has been an engineer or executive of the St. Louis Water Co. (and its predecessor) since his graduation.

1 Simplified, full-floating charging hopper assembly. Improved seal design assures low maintenance cost.

2 Improved overflow-type water tank; non-breakable gauge glass and non-freeze valves.

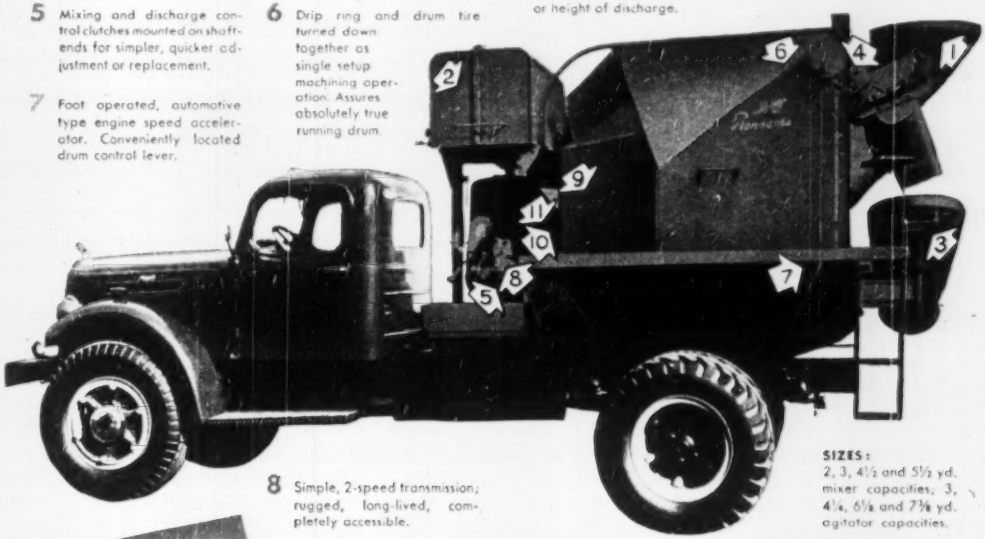
3 Rigid, quick - detachable chute support bracket. Easily swung clear when discharging into hoist buckets; quickly adjustable for slope of chute or height of discharge.

4 Renewable drip ring is quickly, easily, accurately replaced and locked on drip ring flange by 12 cap screws.

5 Mixing and discharge control clutches mounted on shaft-ends for simpler, quicker adjustment or replacement.

6 Drip ring and drum tire turned down together as single setup machining operation. Assures absolutely true running drum.

7 Foot operated, automotive type engine speed accelerator. Conveniently located drum control lever.



8 Simple, 2-speed transmission; rugged, long-lived, completely accessible.

9 Chain-driven drum reduces weight without loss of strength.

10 Trunnion bearing design, with double race bearings for maximum flexibility.

11 Fabricated, all-steel drumhead. Conical section with steel reinforcing ribs absorbs shocks.

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Give the new Hi-Up's features a good going-over — one by one. You'll agree that they add up to more concrete at lower cost — and that *there's more worth in a Blue Brute.* For further facts, see your nearby Worthington-Ransome Distributor, or write for Bulletin.

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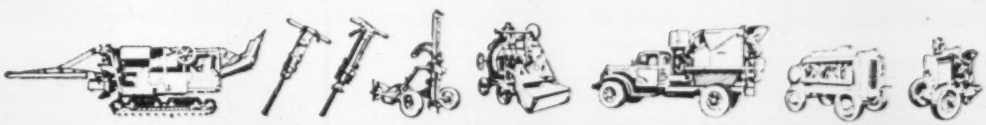
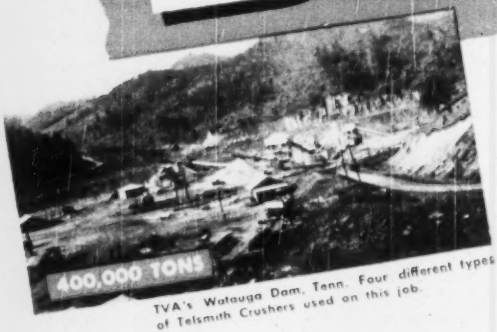


IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

TELSMITH EQUIPMENT FOR DAMS



TVA's Watauga Dam, Tenn. Four different types of Telsmith Crushers used on this job.

Huge dam projects and Telsmith Aggregate Plants go together. Many dam builders call in Telsmith engineers right at the start—for consultation as to the proper plant layout and the right equipment to use. Then Telsmith makes the detailed drawings for the erection of the plant and furnishes most of the machinery. Telsmith designed plants have proven their efficiency on many large projects and Telsmith equipment has a world-wide reputation for the production of low-cost aggregate. The ruggedness of Telsmith equipment is strikingly demonstrated by long life in severest service, on successive projects. After producing 1,500,000 tons of aggregate at Center Hill Dam, the same Telsmith equipment is now turning out about the same amount of aggregate at Buggs Island Dam.

Center Hill Dam, Tenn. Telsmith designed complete crushing-screening plant, and furnished most of the equipment.

Buggs Island Dam, Va. This Telsmith crushing plant also produced the aggregate for Center Hill Dam.

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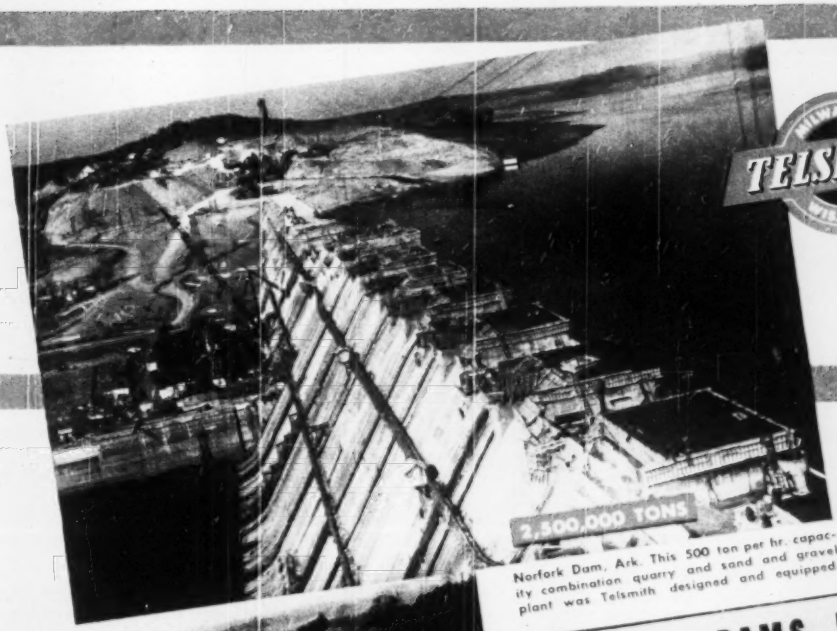

Norfork Dam, Ark. This 500 ton per hr. capacity combination quarry and sand and gravel plant was Telsmith designed and equipped.

Philpott Dam, Va. Here, too, the crushing-screening equipment is Telsmith.

Mount Morris, Dam, N. Y. The 300-350 tons per hour rock crushing plant is Telsmith designed and equipped.

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Ariel Dam, Ariel, Wash.
Boysen Dam, Shoshoni, Wyo.
Carpenter Dam, Arkansas
Cascade Dam, Washington
Clark Hill Dam, Augusta, Ga.
Conowingo Dam, Conowingo, Md.
Dale Hollow Dam, Tennessee
Davis Dam, Nevada
El Presidente Dam, Mexico
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Grand Coulee Dam, Washington
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Water Works

(COMPLETED IN 1949)

WIEDEMAN & SINGLETON
Engineers
Atlanta, Georgia

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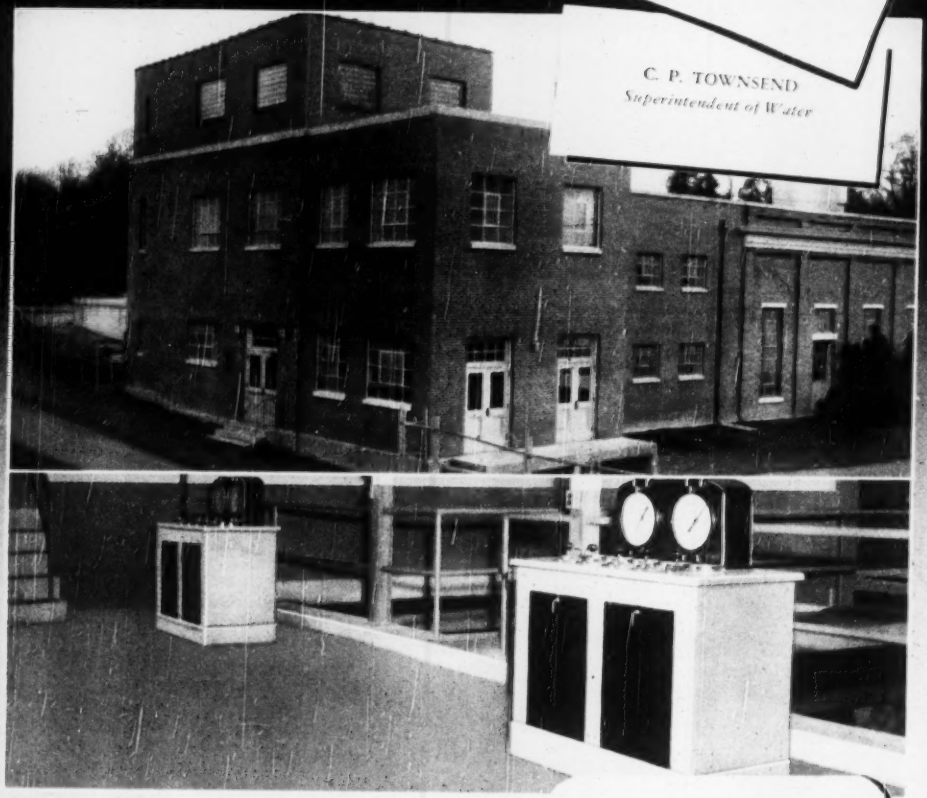
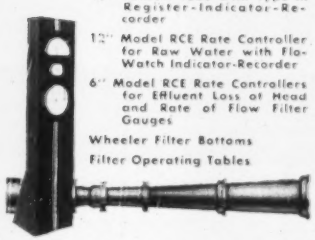


In keeping with the rapid industrial growth of the area, the plant capacity of the Laurens Water Works was doubled in 1949 and the quality of finished water greatly improved. A substantial new building of brick and steel construction, built by Fiske-Carter Construction Co. of Spartanburg, S. C., houses new filter galleries, watertreating units and flow control equipment. In every detail the plant was engineered for maximum operating efficiency, insured through the use of Builders Venturi Meters, Filter Effluent Rate Controllers, Loss of Head and Rate of Flow Gauges, Operating Tables, and Wheeler Filter Bottoms. For Bulletins describing Builders water works equipment, address Builders-Providence, Inc. (Division of Builders Iron Foundry), Providence 1, R. I.

Builders water works equipment furnished for the Laurens, S. C. Water Works:



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- 12" Model RCE Rate Controller for Raw Water with Flo-Watch Indicator-Recorder
- 6" Model RCE Rate Controllers for Effluent Loss of Head and Rate of Flow Filter Gauges
- Wheeler Filter Bottoms
- Filter Operating Tables

BUILDERS PROVIDENCE
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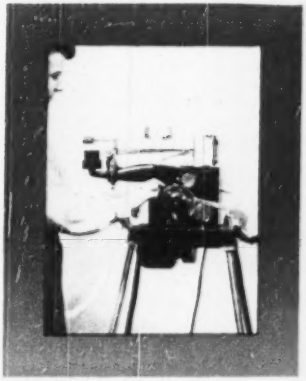
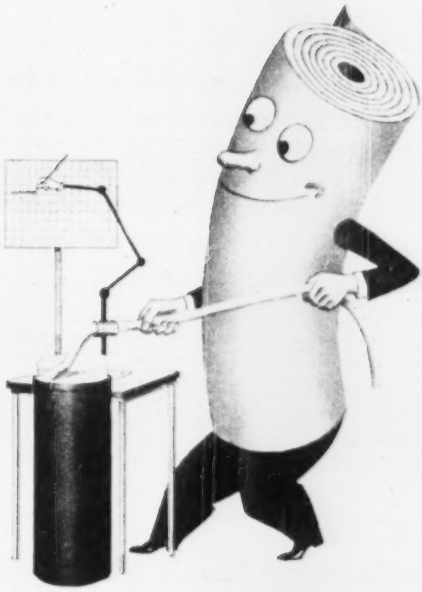


CHECKING EVENNESS OF ROVING WITH LINEAR REGULARITY TESTER. One of a series of laboratory controls throughout production to assure fabric uniformity in all Mt. Vernon-Woodberry products.



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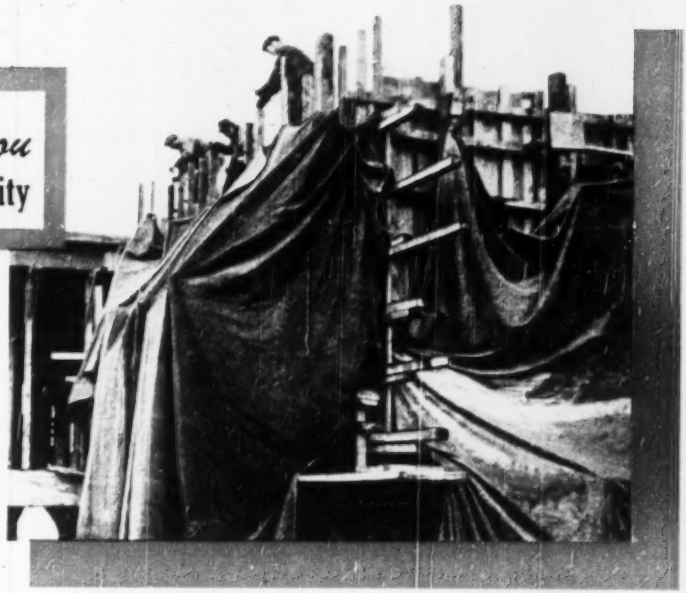

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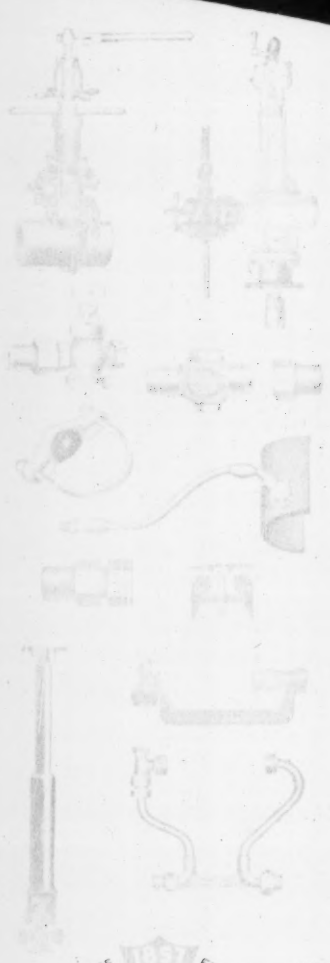

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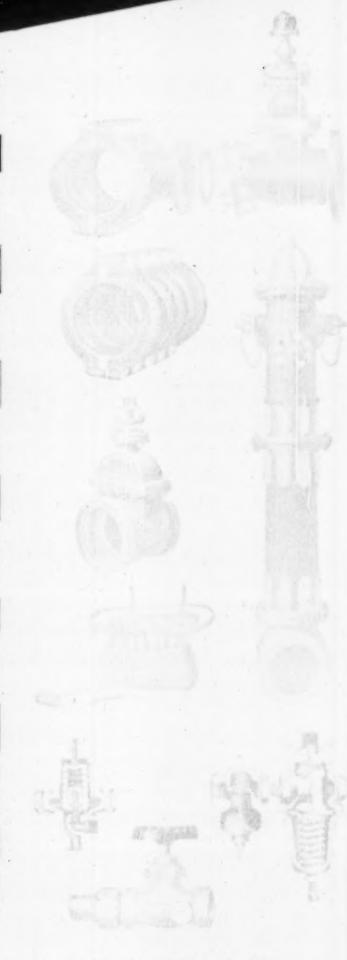

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THE CONSTRUCTION WEEK

THE MILL GRINDS SLOWLY—After watching the snail-slow, gentlemanly pace of the legislators, pundits are now predicting that Congress will be in session until late summer: It will probably be mid-August before the decisions are in on such matters as tax cuts (or new taxes), spending, social security, loans to business and the like. The pace will have a lot to do with business health, because many of the matters grinding through the congressional mill are important to business planning. Example: Most observers think spending will rise through fiscal 1951 to come close to Truman's $42 billion budget, leaving a deficit of $6 billion or so. One evidence of this will come in RFC's mortgage-buying subsidiary, "Fannie Mae". It seems likely that the $250 million in new funds granted her this spring won't last out the year—more will have to be appropriated.

LEAK—New York City, still plagued by the specter of water shortage (its reservoirs are now slightly over 85 percent full) may find one source of conservation outside the city's kitchens and swimming pools: Something over 100 million gallons of clear water is finding its way into sewers close to the reservoir in Central Park each day—from leaks nearby, apparently. That just about equals the capacity of the emergency pumping station on the Hudson River, now building.

SEWAGE FOR COOLING?—A southern California electric utility is now checking the feasibility of using sewage for cooling water in a major steam-power plant. Up to now, its source of cooling water has been the ocean—but company officials want to locate the new plant away from the seacoast so it would be less vulnerable to damage from subsidence and war. Under current plans, the utility would treat the sewage and return it.

IT'S ONLY (TAX) MONEY—The U. S. Supreme Court may have raised an interesting point last week for contractors who built war facilities for the government under cost-plus contracts. It ruled that employes of firms which operated three ordnance plants on cost-plus contracts could sue for overtime due under the Wage-Hour Act. The ruling discarded a contention by the operators that ordnance plants did not turn out products in interstate commerce. Where last week's case may involve contractors who built such facilities (as opposed to those who operated them) is to be found in a case decided recently by the Sixth Circuit Court (ENR May 4, p 12). The circuit court ruled that the Rust Engineering Co. is not liable for $89,000 in back overtime pay to 105 former employes who helped Rust build the Kentucky Ordnance Works. The court held that the construction job was not in interstate commerce. But even if the high court should reverse the Rust decision, the liability would be on government, provided the plant was built under a cost-plus contract.

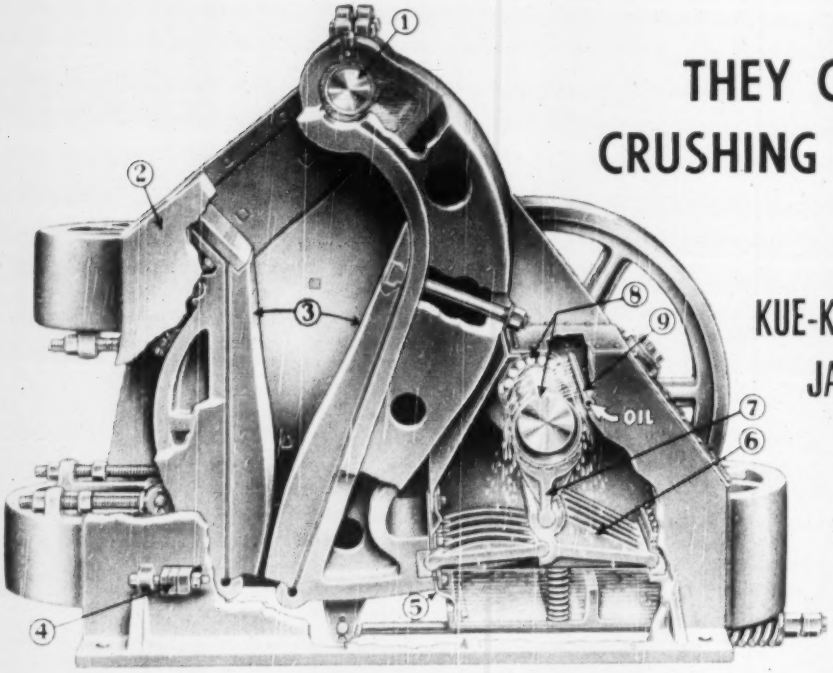
HE WON SOMETHING, ANYWAY—It's pretty legalistic, but Durham, N. C., Contractor Nello Teer won one point in his lengthy legal tangle with the North Carolina Highway Commission. Teer had sued to halt expenditure of money raised from the sale of rural road bonds for construction equipment. Two courts having held the purchase perfectly legal (ENR May 11, p 28), Teer announced he would press the case no farther. For his pains, though, he has the state Supreme Court's word for it that the Highway Commission can be sued without consent of the state. The court held, in part, that ". . . the right . . . to maintain an action . . . to restrain the unlawful use of public funds . . . cannot be denied . . . nor are the doors closed to suits against individual members of a commission . . ."

CONGRESSMEN UPSET DOPE—The House came through with a complete form reversal last week when it went on its economy spree and sustained a $200-million cut (recommended by its own committee) in the Army Civil Functions section of the omnibus appropriations bill (ENR March 30, p. 19). Even more stunning to seasoned political observers was the single further amendment that was approved—a further cut of $1,800,000. Rep. Pat Sutton, Tennessee Democrat, was the axeman on the amendment, moving that the $1,800,000 be eliminated for Cheatham Lock and Dam on the Cumberland River.

WATER PRESSURE?—It hasn't any political future until the President's Water Resources Policy Commission makes its report Dec. 1, but a unique proposal got a lot of plaudits last week. The proposal was Senator Arthur V. Watkins' (R., Utah) suggestion to the U. S. Chamber of Commerce that interstate water and power users' conferences be authorized. They'd be private groups that would contract to repay federal expenditures on water and power development projects. Watkins has introduced a bill embodying the plan. Among the applauders was Colorado's former governor, Ralph Carr—a veteran of considerable standing among water development experts. Said Carr: "The most intriguing suggestion . . . in our generation."

COMPARE THESE FEATURES

THEY CUT CRUSHING COSTS



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1. **HINGE PIN** located and **SWING JAW** designed to "crush without rubbing." Pin extra large. Extra long bronze bearings sealed in oil.

2. **FRAME**: Steel side plates welded to box beam strong backs for maximum strength and stress relieved after welding.

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5. **DIAPHRAGM** is non-wearing, flexible, seals oil without hampering toggle and jaw movement.

6. **TOGGLES** of heat-treated alloy steel operate in sealed oil bath for long life.

7. **PITMAN** is simple, strong, weighs 1/10th of ordinary type — always in compression. No caps, bolts, shims needed — permits 50-60% higher speed than old style crushers. Flooded with oil, runs cool at 350 to 425 strokes per min. More capacity, more uniform product.

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9. **LUBRICATION**: Completely sealed — dirt stays out, oil stays in. Oil pump constantly floods all mechanism. Pressure switch automatically stops motor if oil pressure drops or in case of overload.

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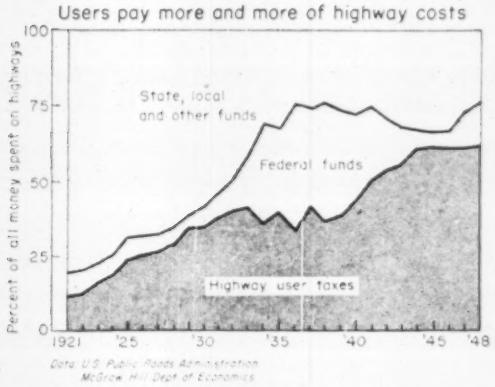
CONSTRUCTION TRENDS



HOW CAN WE PAY FOR THE HIGHWAYS WE NEED?

Motor vehicles in the U. S. increased another 8.6% last year, according to the Bureau of Public Roads.

That's one more bit of evidence added to a pile of studies in the last five years which show that the nation is far behind on its road-building job. Estimates of the U. S. highways needs range above $40 billion.

It's also clear—although the studies on it are fewer—that new roads will pay for themselves. Poor roads now cost motorists more (in added tire, gasoline and repair expense, to say nothing of time and accident damages) than it would cost to rebuild and expand them.

But the question still is: How can we pay for an expanded program of highway construction?

Where the U. S. is spending an estimated $1.9 billion in 1950, studies of highway needs indicate it should be putting at least $3 billion into new highway construction each year. How can something more than $1 billion in additional funds be raised each year?

The figures on how roads are financed show some clear trends. The highway user puts up more and more of the money. Special taxes on highway users provided 12% of highway funds in 1921. They now pay 62% of the bill. The federal government's share has gained also, but much less spectacularly. Thirty years ago, it contributed 8% of the money. In 1948, (the most recent figure available) it provided 12%.

Meanwhile, of course, contributions of state, county, and local governments have fallen off. From 80% of the total in 1921, these are down to about 16% now. This is one aspect of the overall financing problem of state and local governments. Their revenues are tied to real estate levies. These have gained only slowly over the years, while federal revenues from income taxes have soared, augmented by other new taxes.

Diversion of highway taxes to other uses is comparatively small. In 1948 it was less than 10% for the country. It is important in a handful of states—notably New York, Georgia, California, Texas, Oklahoma, Ohio and Rhode Island.

Diversion by the federal government, however, runs to big money. The government in 1948 collected about $1.2 billion in excise taxes alone from motorists. These are federal taxes on gasoline, oil, tires and tubes, automobiles and motorcycles, trucks and parts—paid directly by highway users.

But the federal government's contribution to highways, including the money spent by the forest and park services, was less than $400 million in that year.

Congress this year will restore some balance to this picture—if it cuts excise taxes and raises the U. S.'s appropriations for highways. All in all, the federal government from its highway revenues alone could spend up to three times as much on highways.

Beyond that, the state and local governments have the capacity to borrow more. There's ample room for debate as to whether or not it is good fiscal policy to borrow for roads. Governor Dewey of New York fought long and hard to keep construction in his state on a pay as you go basis. But with today's pressing needs for roads, there will be many state and local governments that will elect to borrow. These governments as a group are paying in interest ($102 million in 1948) about half of what they did in 1929. And it is still less than two thirds of the 1940 interest bill.

In addition, roads are being financed increasingly through authorities. A semi-public agency builds the highway or bridge and pays for it, usually with revenue bonds secured by tolls collected from drivers. This relieves local governments of debt and financing problems while providing a superior type of road promptly, but the cost is much higher than for a free road. Also, such roads can only be built in areas of heavy traffic density.

In Pennsylvania, however, a variation of the idea, which has broad possibilities, is being used (ENR March 16, p 36). There, a state Highway and Bridge Authority may issue bonds up to $40,000,000 with which to build roads and bridges. These it rents to the state highway department. The state makes no heavy capital outlays and it does not expand its debt. It pays annual rents out of annual revenue. Clearly, the authority can be useful in financing a highway program.

Another method of financing is proposed by the American Association of State Highway Officials as an alternate to toll financing. It calls for Congress to permit states to use federal-aid money in future years to retire bonds issued now to build badly needed roads.

STEEL FRAMING A CHURCH WITH MACOMBER NAILABLE STEEL TRUSSES AND JOISTS

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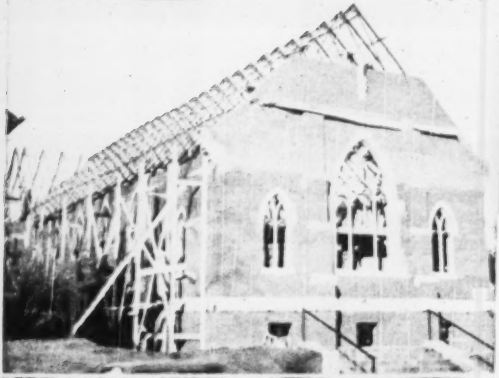

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Jobs for Engineering Graduates

A SOMEWHAT GLOOMY OUTLOOK for young men who will graduate from engineering schools this spring is painted by the U. S. Bureau of Labor Statistics in its report "Employment Outlook for Engineers" (ENR March 16, p 261). Enrollment has been so high during the past few years that graduates now exceed job openings. These findings are confirmed by an independent check made by the Engineers Joint Council.

On the brighter side, the Bureau of Labor Statistics reports that jobs for engineers are rising and that the number of employed engineers may increase by as much as 100,000 during the next ten years, rising to 450,000. Engineering is now the nation's third largest profession and the fastest growing. Looking ahead, the Bureau of Labor Statistics expects to see the number of engineers employed by industry continue to rise and it expects the number of students in engineering schools to decline from the 1947 peak. As a result, the present excess will be absorbed and supply and demand should about balance in the latter part of this decade.

All this points to the importance of broadening the base of the training given students in engineering schools and to the importance of providing better opportunities for young graduate engineers to continue their training in evening classes after they go to work. Broader training makes it easier for them to get jobs and makes them more useful to employers, thus reducing the possibility of their being dropped when business is dull.

Maryland Test Pavement

FROM A PRACTICAL STANDPOINT, the extensive truck-loading tests to be run this summer on the mile-long section of Maryland concrete pavement should settle a controversial question of long standing. What strength concrete pavement is needed to safely carry present and proposed heavy truck loadings? Performance factors of existing pavements, together with small-scale field and laboratory tests by the Bureau of Public Roads and some highway departments have shed some light on this problem, from time to time, but results have often been too inconclusive to warrant widespread adoption by other states. The fact that the 9-year-old pavement to be tested was designed for normal truck and auto traffic, and built by conventional methods, takes the project out of the "laboratory" class. Its load-carrying characteristics will find a parallel in many existing pavements of similar age and design.

But the successful organization of this test project has a wider implication. It sets a precedent whereby state highway departments—acting through some non-profit organization such as the Highway Research Board, as in this case—are permitted under their state laws to contribute funds and enter into cooperative experiments on highway problems. Large-scale tests of other types of highway pavement are needed, and similar test projects should be started without delay by groups of states faced with common problems of pavement design and traffic requirements—all acting together to expedite results on an economical basis.

When the results of the Maryland pavement tests are compiled and analyzed, it should not be too difficult to convince road users and road designers of the proper way to build roads or to demonstrate the need for limiting the weights of trucks using them. Then, if we can convince the public and our politicians of the necessity for improved designs in new construction, as well as higher type methods of reconstruction, we will have made a long forward step in highway transportation.

An Advance in Filtration Practice

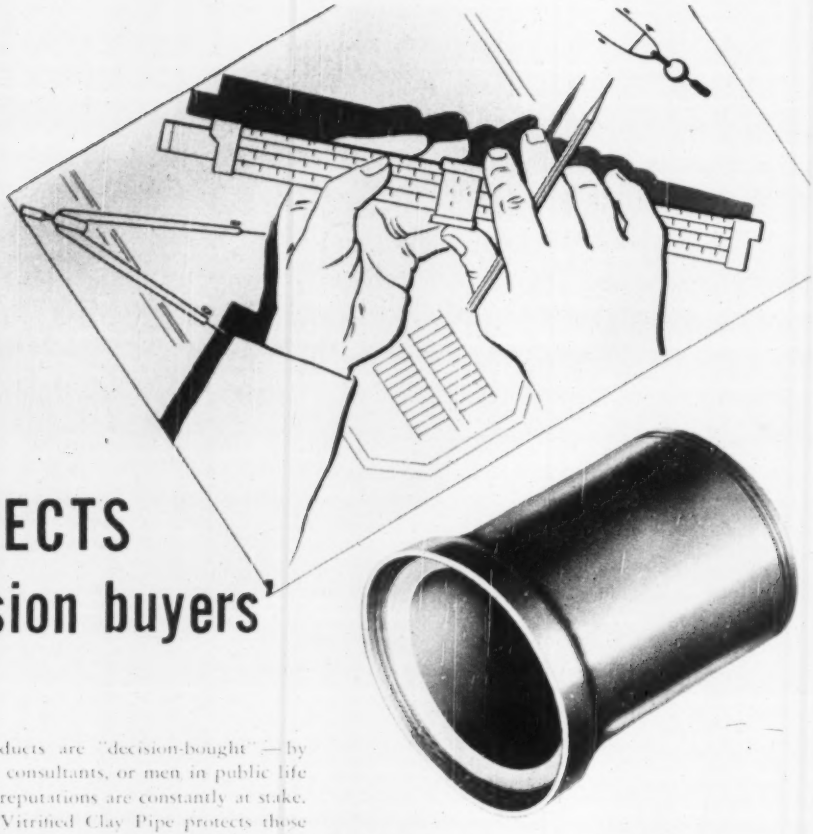
DIATOMACEOUS EARTH FILTERS have a good record in turning out clear industrial process water and field supplies for troops. But sanitary engineers—concerned with protecting public health—have hesitated to put them to work for treating domestic water supplies on a day in and day out basis. The feeling has been that such filters were not reliable enough to produce a safe water consistently.

Improvements in design and operation of diatomite filters have proceeded at a fast pace since the end of the war. Pilot plant as well as full scale performance now indicates that they have come of age. They can produce safe water for domestic consumption reliably with reasonable supervision.

As a result of this convincing evidence, engineers may now—without public health risk—make good use of the economic advantages of diatomite filters. The advantages—over conventional sand filters—are reported to be 1/10 the space, 1/4 the head loss and 1/4 the cost (ENR May 4, p 24).

With the blessing of progressive state health departments, two diatomite filter plants are now in operation: Cherry Valley, N. Y. (see p 35) and Mounds, Ill. Comprehensive experiments, moreover, which indicate that it is feasible to use this type of filter on large supplies, suggest that Los Angeles may soon build a plant capable of handling perhaps 100 mgd.

Sanitary engineers have in the diatomite filter a comparatively new tool that shows bright promise of becoming a major advance in waterworks practice. They can speed progress by studying its design and operation and by putting it to work where reliable performance is assured by pre-design investigation.



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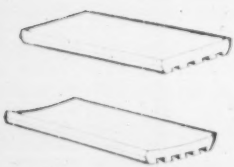
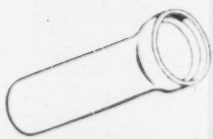


LINER PLATES



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ENGINEERING NEWS-RECORD

MAY 18, 1950 VOL. 144 NO. 20

Structures withstand floods in Canadian disaster

Winnipeg hardest hit, but Nebraska and North Dakota reports floods also, with threat seen in Pacific Northwest —Dikes hold, although overtopped, at Winnipeg

ENR Staff Report

Floods—One of them steadily engulfing Canada's fourth largest city—were top engineering news this week.

None of the disasters pointed up any major engineering failures. They were the results of freakish weather conditions that pushed rivers far above record stages in many places. Property damage was high, but loss of life and major structures was surprisingly little.

Most spectacular of the floods was that still in progress at Winnipeg, Canada capital of the province of Manitoba, a city of more than 300,000 population. Other flood conditions were reported in Nebraska and North Dakota. And in the Pacific Northwest, Army engineers and city and state officials were keeping wary eyes on the heavy snowpack, which, with unseasonable warm weather, might be setting the stage for a Columbia River flood that engineers feared might go as high as the disastrous floods of 1948.

• **Winnipeg hit worst**—By far the most serious threat was at Winnipeg, where the Red River of the North, picking up great quantities of runoff from its source across the international boundary in Minnesota, progressively ate its way into ever larger portions of the city.

Winnipeg isn't at all unused to floods of the Red River (which flows almost due north from its sources in Minnesota and joins the Assiniboine at the city). They are a regular occurrence, but this year's flood has already topped all records since 1852. ENR's news sources in the United States indicated that unusually heavy snowpack on the Red's headwater area melted suddenly—well before upriver ice had broken—and is largely responsible for the tremendous flow.

Winnipeg authorities had some warning of the floods, when the Canadian town of Emerson—a border community—had, to adopt emergency measures against floods a week before conditions became serious at Winnipeg. There, officials immediately began planning evacuation of low-lying residential areas of the city (the business district is on higher land), and began taking steps to reinforce the city's system of dikes. Electric power utilities serving the city and its suburbs are on the riverfront.

Canadian Army headquarters detailed Brigadier General R. E. A. Morton to take command of the area, and sent engineer troops from Calgary and Chilliwack, British Columbia. However, the bulk of the force enlisted to fight the floods is made up of civilian residents of the city, who have been turned to for manual labor to sandbag the city's dikes, control traffic and evacuation, man pumps and perform other labor. At the end of last week, it was estimated that one thirtieth of the city's population was at work on the dikes, and that some 70,000 persons—mostly women, children and aged and sick—had been evacuated. Authorities said more evacuation would be ordered if the river was to rise two more feet.

FLOOD AREA—Shaded area on this map represents the Red River flood area in southern Manitoba, Can. Winnipeg, (A) is the major city in the flood area. A large part of its residential area was inundated. Flood conditions were reported as far upstream as Grand Forks, N. D. (Wide World Photo)

At week's end, most of the dikes were still standing, but some six square miles the low-lying areas of the city were under water (as were

Professional fees face antitrust test

Antitrust action against fee fixing by architects and engineers is forecast by Justice Department experts. It will result from the recent Supreme Court decision outlawing the fixing of minimum fees by the Washington, D. C. Real Estate Board.

Principles laid down in the decision:

Real estate brokers are engaged in trade, within the meaning of the antitrust laws, and are not entitled to the exemption given to labor unions.

The court held that real estate brokers are entrepreneurs, each in business on his own. In his opinion, Justice Douglas wrote that the activity of the brokers "is commercial and carried on for profit. The fact that no goods are manufactured or sold in the process is irrelevant.

The court noted specifically that it was not ruling on or discussing the applicability of its decision to fee fixing by the professions. But the Justice Department will bring cases to determine whether such fee fixing also will be banned under the antitrust laws.

In considering the relation of this decision to the practice of the engineering and architectural organizations in promulgating minimum fees, it should be noted that the decision is not expected to have much effect on the Washington real estate brokers. The court has outlawed the fixing of minimum fees by an organization of the brokers—but there is little that can be done if each broker now chooses, on his own, to continue to charge the fee suggested by his trade association.

In fact, the record revealed, as the court noted, that there was no evidence to show that the real estate board had undertaken any enforcement or punitive action against members who undercut the fee schedule.

some 567 square miles of land in the river valley).

Although the electric utility was still functioning, all schools and theaters had been closed, civilian traffic was closely controlled. All bridges—even though some are completely submerged—were still in place.

Sandbags for the dikes—and supplies of food, and medicines—were being flown in to the area by an airlift organized by the Canadian government, with assistance of both U. S. and Canadian private operators.

By Sunday, ENR's correspondent at Winnipeg reported that flood stage was at 30 ft 2 in.—more than 12 ft above minimum flood stage. Predictions were that the water might yet go several feet higher.

General Motors set up an emergency planning committee with an engineering section headed by Col. E. J. W. Atkins, an engineer officer, to inspect and prepare recommendations on structures and on various escape routes. All local engineering personnel is being registered for service on short notice.

Carloads of Bailey bridging were being used to strengthen weakened or submerged spans, and authorities expressed some fear that debris accumulating on the *upstream* sides of the submerged structures might further weaken them.

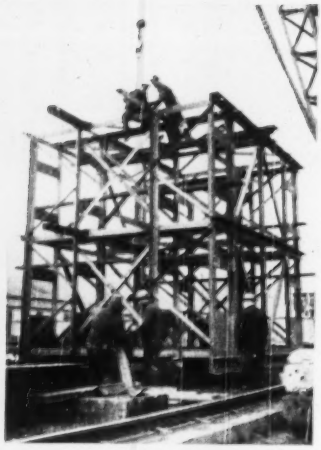
• **Other floods.** South of the Canadian border in North Dakota, highway department's fought to repair frequent road washouts as flash floods sent smaller streams over their banks.

The Northern Pacific Railroad, plagued by the same series of floods that hit farther south at Winnipeg, found certain sections of its tracks near the U. S.-Canadian border washed out by similar flash floods.

And in southeast Nebraska, the normally quiet Blue River rose suddenly, inundating part of the State Capital at Lincoln and a dozen smaller towns. The floods were sudden, and caused at least 12 deaths and considerable property and stock damage.

• **Flood threat.** In the Pacific Northwest, the U. S. Coast and Geodetic Survey warned of possibility of heavy flooding on the Columbia River and its tributaries, as it eyed the heavy accumulation of snow. A freakish weather forecast, as this week started, which called for unusually warm weather and rain, contributed urgency to the C&GS warnings.

"Water in the Pacific Northwest snow packs is definitely above normal," USCGS experts said, "and a definite flood potential exists." Most of the mountain streams had not yet started to rise; the service added, but the total volume of spring runoff is expected to be large.



BIG FOOTBRIDGE—Fabrication of part of a 919-ft span for a pedestrian bridge across the Harlem River, New York City, between 103rd St. and Wards Island takes place at the Ambridge, Pa., plant of American Bridge Co. Erection will begin in July.

New York 1-story school cuts cost per pupil 30%

Contracts have been awarded for construction of the first one-story elementary school in New York City in modern times. Cost per pupil of this structure, Public School 128, is reported to be 30% lower than the average cost per pupil for New York City elementary schools during fiscal 1949.

To be built in the borough of Queens, PS 128 will be T-shaped in plan, 157x125 ft, with 50-ft-wide wings. It will have a structural steel frame and 10-in. brick and concrete cavity exterior walls.

The school will not have a basement. Floors will be constructed with 8-in. tamped stone on earth, 4-in. reinforced concrete, 3-in. cement layer, 2-ply membrane waterproofing, 1-in. insulation and 2-in. concrete.

Most of the building will have a flat roof made up of 2-in. sheathing on wood joists, 2-in. insulation and 5-ply membrane slag roofing. Flashing will be copper. Ceilings in general will be perforated acoustical tile attached to two layers of 3/8-in. plasterboard.

There will be seven classrooms, a kindergarten, a play and lunch room, and offices in the one-story, 302-pupil school. Floor area totals 13,500 sq ft; cubical content is 156,000 cu ft.

Matan Construction Co. was low bidder at $233,300 in competition with 15 other contractors.

The total construction cost of $288,900 averages $956 per pupil, $21.72 per sq ft and $1.53 per cu ft.

Rainmaking gets go-ahead in New York court case

Rainmaking hurdled a legal barrier in New York Supreme Court last week. Justice Ferdinand Pecora refused an injunction against New York City rainmakers sought by Catskill Mountain hotel owners.

Justice Pecora found the plaintiff's interests "opposed to the general welfare" and their fears of damage by man-made rain baseless and "purely speculative."

In the judge's opinion a real water emergency exists, and "until permanent facilities are finished, such emergency means as rainmaking are in order for increasing supply." Also Justice Pecora pointed out to the plaintiffs in his ruling that they have "no vested property rights in the clouds or the moisture therein."

New York City has State Water Power and Control Board approval of its artificial rain activities. But, as yet, there is no legislation authorizing cloud seeding. The city felt the emergency too great to delay any worthwhile attempt at alleviating it, and the Department of Water Supply, Gas & Electricity is going ahead with rainmaking efforts by order of Mayor William O'Dwyer. The City Corporation Counsel's office is reported to have studied legal problems involved, but no conclusions have been made public for the time being.

Meanwhile, Wallace E. Howell, the city's $100-a-day consultant meteorologist has shouldered credit for rains falling on and around the watershed since his operations began late in March (ENR Mar. 23, p 79). Department spokesmen have indicated that efforts so far may have increased natural rainfall but have made no definite claims.

More homes started in April than ever before

Builders started more homes last month than were ever put under construction before in any one month, according to recently received estimates from the Bureau of Labor Statistics.

They started 126,000 nonfarm dwelling units. That's 16,000 or 14% more than in March, the previous all-time record.

April home building was 45% greater than last year and 27% above the year before.

So far, this year, builders have started 594,700 units, 53% more than the 258,100 units started in the same four months last year.

BLS has revised its January estimate from 80,000 units down to 78,700.

Point 4 approval enlists engineers in nation's foreign-aid campaign

Senate ok's authorization—Fund total still open—Plan aims at export of U. S. knowledge, experience to help raise world living standards—Encouragement sought for private capital to participate

Still another foreign aid program—the export of American know-how and the living standard it brings—has all but become law.

It's been almost 18 months since President Truman, in his inaugural address, first proposed that the United States show interested nations what we do and how we do it—a program as thoroughly reliant upon U.S. engineering brains as on U.S. dollars.

That principle has finally been endorsed by Congress. There remains some conference committee haggling over how much shall be spent to do it. Thereafter, the funds themselves must be appropriated.

But the principle of spreading our knowledge among those who need it and want it was accepted when the Senate passed the foreign aid authorization bill for fiscal 1951.

By the thin margin of one vote, the Senate accepted the administration's proposal of $45,000,000 for such assistance. The House had ok'd $25,000,000. The bill as in conference, which may settle on about $35,000,000. Then, if Congress appropriates on that scale, the administration will have money enough to make more than a token start on its program.

Speculation on the mechanics of technical assistance has brought conflicting rumors to Washington. Some inferred that operating procedures had been planned in minute detail. That's impossible at this stage, but the broad outlines are clearly drawn in the law and in committee reports.

• **Existing programs included**—Obligations covered in the authorization include present technical assistance programs of the United States. There's also a contribution to support similar United Nations activity. U.S. programs will take about $10,000,000.

Size of the voluntary contributions by the United States—and by the other participating countries—to the United Nations central fund will be determined by a technical assistance conference to be held as soon as possible. Originally scheduled for May 17, the conference probably will be postponed until U.S. delegates get final word on the appropriation.

Other participating countries may contribute about $40,000,000 to the United Nations technical assistance fund. Depending on the amount they volunteered, the United States probably will match or better it. Presumably at least $40,000,000 of U.S. money will go to the U. N.

That leaves $10,000,000 to $15,000,000 for new U.S. technical assistance programs. Not all that money can be spent on new programs. Administering a $35,000,000 program probably will take more than $2,000,000.

• **President runs it**—Administrative authority for the entire program rests with the President. He intends now to delegate this authority to the Secretary of State.

The President will appoint an administrator who will be subordinate to the Secretary of State and have under him a planning and policy staff—not an operating agency.

Two groups of advisers will assist. One will be a 15-man advisory board, including a chairman appointed by the President subject to Senate approval. Mr. Truman is expected to nominate as chairman the officer who will head the program. A second group will coordinate planning and operation of individual programs. Members will represent executive departments that actually carry on the programs.

• **New operating agency**—Congress and the State Department agreed to the creation of a new operating agency to do for the rest of the world what the Institute of Inter-American Affairs has been accomplishing in Latin America on health, sanitation, agricultural and education projects. The IIAA program will continue with $7,000,000 of the money authorized by the bill. Likewise, the assistance programs carried on by the Interdepartmental Committee on Scientific and Cultural Cooperation (SCC) will go ahead with $3,000,000 from the same fund. In fiscal 1949, SCC spent $2,700,000 for technical services of about eight departments or agencies on technical assistance activities in Latin America.

Point 4 assistance will go only to countries that request aid, pay a fair share of the cost, coordinate all their technical cooperation programs, use the results, and cooperate with other participating countries.

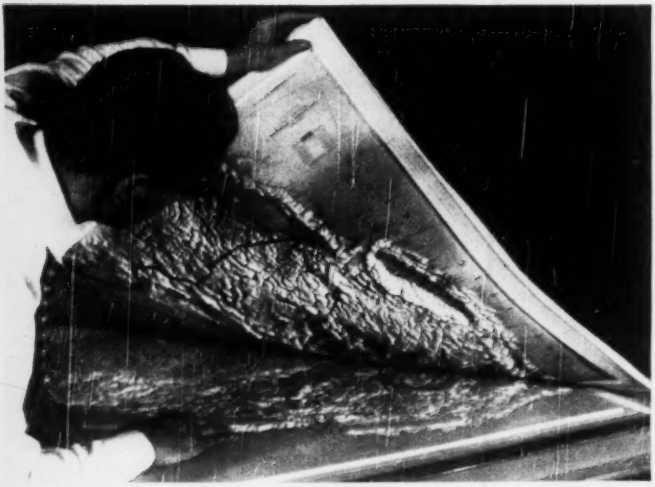
• **Private resources sought**—The bill emphasizes the use of private resources. It directs the administrators to seek the participation of private agencies, firms and persons "wherever practicable."

A partial list shows that 71 American voluntary agencies, 145 business firms and 98 colleges and universities have rendered technical assistance in some form. These and other private sources of technical aid will be utilized.

• **How they'll do it**—Two principal methods will be used. First of these is the "joint management operation" now employed by IIAA. It is a cooperative service organized by agreement between two governments, as a bureau in a ministry of the host country. The director, usually an American, is the expert in chief. His staff includes tech-

(Continued on page 26)

V.A. ADDS A HOSPITAL—Dedication ceremonies will be held May 21 for the Franklin D. Roosevelt Hospital, at Peekskill, N. Y. It has facilities for 1,965 patients in 37 buildings on a 383-acre tract. Merritt-Chapman & Scott Corp. was contractor for 32 of the structures.



LIGHTER AND BRIGHTER—Lightweight plastic relief maps, formerly covering only certain regions, now are available for the entire United States. They are made by subjecting a plastic sheet to heat and pressure over a mold. Before molding, the plastic sheet has its information printed on it in 11 colors, eliminating the need for costly hand lettering and coloring. 64x40 in. in size, the map weighs only 2¼ lb. It can be cleaned easily with a damp cloth.

Point 4 plan approved

(Continued from page 25)

nicians from both countries. The operation is financed through a joint fund supplied by the two governments.

Where a thorough overall study of a country's needs and resources is required before specific planning, another approach the joint commission for economic development will be used. This employs a commission of experts from the two countries supplemented if necessary by officers from international organizations, who may be added by mutual consent. Both countries share the cost. A good example of this approach was the recent joint United States-Brazil Technical Commission, known as the Abbink commission.

For either method, the choice of U. S. personnel will depend on the kind of experts needed. Both private sources and government agencies will be tapped for engineers, economists and other qualified personnel.

• **Get in, get done, get home**. On all projects, the objective of U. S. experts will be to "work themselves out of business." The purpose of Point 4, as the State Department sees it, is to teach others how to do the job, not to move overseas and do it for them.

Even with that long-term objective, much interim work is bound to develop for U. S. consulting firms and contractors. Many projects must be designed and built by people from outside underdeveloped countries. Both government agencies and private firms will be called upon to help with the engineering.

Congress directed "the executive branch to work for conditions that will attract private capital to underdeveloped countries." It pointed specifically to treaties like that recently signed by the U. S. with Uruguay, assuring equitable treatment to U. S. investors.

Investment guarantees by the U. S. government are not a part of the foreign aid bill. They are being considered by Congress in a separate measure. There is little chance of any action on the investment bill at this session.

Lt. Col. Powers named Norfolk district engineer

Lt. Col. William E. Powers will become district engineer at Norfolk, Va., July 15. Maj. Gen. Lewis A. Pick, Army Chief of Engineers, announced the new assignment.

Colonel Powers has been executive officer, Engineer section, of the 4th Army, Fort Sam Houston, Tex., since 1948. He will succeed Col. George E. Digby, Norfolk district engineer since 1946, who will attend the Industrial College of the Armed Forces at Fort McNair, Washington, D. C.

Edwin S. Webster dies; Stone & Webster cofounder

Edwin S. Webster, 82, a cofounder and retired chairman of Stone & Webster, Inc., engineering and management consultants, died at Chestnut Hill, Mass., May 10.

Born in Boston, Mass., Mr. Webster was graduated from Massachusetts Institute of Technology in 1888 with the degree of Bachelor of Science. He organized his firm with the late Charles A. Stone, a close friend and classmate.

Stone and Webster was the predecessor of the present corporation, with offices at 90 Broad Street, New York, and at 49 Federal Street in Boston. At the outset, the firm confined its activities to the electrical engineering

Edwin S. Webster

field, especially as it related to public utilities. Operations were expanded later to include general design, engineering and construction work, supervising services and investment banking.

Construction and engineering work alone has aggregated more than $2 billion worth since the company's formation.

Among the larger war projects of the company were the electromagnetic plant for the production of atomic bomb materials at Oak Ridge, Tenn., and synthetic rubber and other process and manufacturing plants. In the first World War, the company built the Hog Island Shipyards and ships for the Emergency Fleet Corp.

Mr. Webster was president of the company for many years and became chairman in 1941 upon the death of Mr. Stone. He retired in 1946, but continued as a director. He was a life member of the corporation of M.I.T. He was a member of the Boston Society of Civil Engineers.

Strike halts all work on Delaware Bridge

Dispute involving 24 men stops work by almost 500 on $40,000,000 structure near Wilmington

A recognition strike involving directly only 24 men tied up all work on the $40,000,000 Delaware River Memorial Bridge late last week. The stoppage resumed effective May 15, although there was some hope of settlement that day.

Twelve members of Local 542, of the AFL Operating Engineers Union, walked off a grading job on the bridge approaches May 10. They were joined soon after by 12 others on the same job, who were not union members. A picket line was established which was honored by about 160 more workmen, members of Local 451, AFL Structural Iron Workers Union, employed by American Bridge Co., who had been awarded contract for the superstructure.

The following day, about 300 more workers, employed by the Merritt-Chapman & Scott Corp., contractor for the substructure, halted work. All who did report were sent home when some of them, reportedly members of local 542, failed to come to work. Merritt-Chapman & Scott had been working 6 days weekly in an effort to complete its contract by the end of June.

• **No union contract.** Only contractor directly involved in the strike was the H. C. Eastburn and Sons Co., which held the grading contract. Henry Eastburn, head of the firm, said the affair began about two weeks before the walkout when he refused to sign a contract with the Operating Engineers. He said he could not grant the wage scales sought by the union because he had bid the job on the basis of rates he had been paying under an open-shop operation in that area.

Eastburn said his rates were $1.65 per hour for bulldozer operators and $2 per hour for mechanics. Gerard Leone, business agent for Local 542, said the union is demanding $2.52 hourly.

Eastburn said he would seek an injunction to halt picketing.

The grading contract was about 20 days away from completion, Eastburn said.

The bridge is one of three major bridges being erected within a 200-mi stretch of the Atlantic Coast. (ENR Apr. 20, p. 132). It will cross the Delaware near Wilmington. In building it, Merritt-Chapman & Scott sank the largest caisson ever built for the west anchorage of the 2,150-ft suspension span.

CIVIL ENGINEERING IN THE OIL FIELDS—Reservoirs and water wells are part of the process for recovering oil from worn out wells in the Texas fields. Engines driving the pumps operate on waste gas; use water from wells and accumulated in pits.

Truman's business plan: loans, capital

The administration's key "aid to business" program was before Congress this week: a bundle holding out the promise of easier credit and more equity money for small businesses—and more advice from government officials.

The President shot the proposals to Capitol Hill before taking his non-political swing around the country.

If enacted, said the President, these business proposals would:

1. Help solve the problems facing small business.

2. Help keep the economy strong, stable, and expanding.

3. Help combat concentration of economic power and foster competition.

The message had been long anticipated. It was, in fact, overdue as the result of wrangling among top officials over the details. Specifically, here's what Mr. Truman suggested that Congress enact this session:

1. Government insurance of private bank loans to small business up to $25,000 for not more than five years. It's compared to government-insured mortgage loans.

2. Federal chartering of new national investment companies to be organized and owned by private investors and banks, but supervised by the government. Purpose: Provide equity capital and long-term loans for companies that can't get funds elsewhere.

3. Transfer the Reconstruction Finance Corporation to the Commerce Department and authorize RFC to relax its collateral requirements, increase its participation in private bank loans, and extend maximum maturity of its loans to 15 years.

Commerce would run the loan-insurance program, too. Federal Reserve Board, however, would have the new capital banks.

Big surprise to most businessmen was the proposal to put RFC under Commerce Secretary Sawyer. Mr. Truman promised to send up a reorganization message on this, which means that, unless either House or Senate votes it down, the transfer automatically takes effect.

• **Concedes tax inequity.** There was another eyebrow raiser in the message, too. In effect, the President admitted in a back-handed kind of way that the present tax structure does hamper private investment. To help his new capital banks to get going, the President said, they should have special tax concessions, particularly in permitting them to build up reserves.

On this and other parts of the package, however, Congress will have to act affirmatively before anything happens—and it's clear that nothing is going to be rushed. For one thing, Senator Maybank, whose Banking and Currency Committee must first approve, is currently tied up with another Truman program—the Fair Employment Practices bill. And until his filibustering services are no longer needed by his southern colleagues, Maybank won't give Mr. Truman's aid-to-business package a second look.

Once hearings get underway, however, it's conceded that the loan-insurance program has the best chance. A handful of private banks big enough to spread the risk already have their own small business loan programs—essentially character loans—and have found them successful.

President signs law for science foundation

New agency, to promote basic research, will spend about $15,000,000 per year —Search on for director

The government program for financing basic scientific research and training scientists finally is being set up.

President Truman signed the National Science Foundation bill, recently passed by Congress after four years of effort to please scientists and Mr. Truman.

In 1947, Mr. Truman vetoed a bill favored by such outstanding professional leaders as Vannevar Bush because he did not like the scheme for having the foundation run by scientists, free of Presidential direction.

The new foundation will be run by a director appointed by the President. There will be a board of scientists, too, but it will be only advisory.

• **Banker for science.** The foundation primarily will be a disbursing operation paying out around $15,000,000 a year to universities and private laboratories for basic research and granting scholarships for graduate and doctorate studies.

Congress has authorized $500,000 for the foundation during the forthcoming fiscal year. For each year thereafter, Congress has authorized $15,000,000 yearly.

Though the main idea is to give a lift to pure scientific endeavor, some of the money can be allocated for national defense projects—nuclear research, bacteriological experiments.

As a matter of fact, Mr. Truman is thinking about transferring to the foundation some other research and fellowship programs now run by the Public Health Service, the military, Atomic Energy Commission and the like. The government now is spending considerable money in such research activities.

Contracts with laboratories and grants to students won't get going very quickly. Rather, the foundation in the first year will undertake a survey to find out what the glaring needs of science are.

The foundation will concentrate on physics, chemistry, medical research, and engineering to some extent.

• **Bush could have job.** The search is now on for a director. A scientist is wanted. Though Truman's original thought is not completely dropped, it appears to be out of the question to get Dr. Bush to head the foundation program. Tangled with the interests of professional engineers, Dr. Bush, who headed up the wartime Office of Scientific Research and Development, will take the job of directing the foundation only if he is convinced that he can get the kind of legislation he wants.

DAVIS DAM POWER PLANT—Workmen are pouring concrete with a 4-yd bucket and a short elephant trunk for unit 1 of the Davis Dam power plant, on the lower Colorado River below Hoover Dam. Note the metal platform on which workmen stands to operate the dump mechanism of the bucket. The powerhouse is to be substantially complete this year. (Bureau of Reclamation Photo)

have it. It was his 1945 report on the sad state of pure science in the U. S. that gave rise to the proposal for a federally financed foundation.

The federal funds is supposed to be distributed on a wide geographical basis as possible, and recipients of aid will have to pass loyalty checks by the Federal Bureau of Investigation.

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New grandstand standards are announced by ASA

New developments in grandstand construction are recognized in the latest edition of the American Standard for Places of Outdoor Assembly, Grandstands and Tents, Z20.1-1950, just announced by the American Standards Association.

Included are specifications for the foldable-type grandstand and the tractor-mounted seating arrangement used by circuses. The standard replaces two previous standards for portable steel grandstands (1941) and for places of outdoor assembly, grandstands and tents (1946).

Copies of the standard, sponsored by the National Fire Protection Association and the Building Officials Conference of America, may be obtained from the American Standards Association, 70 E. 45th St., New York, N. Y., for 25 cents a copy.

NW ASCE groups study public relations help

Seattle section suggests campaign to "sell" engineers to the public, improve economic status

Pacific Northwest sections of the American Society of Civil Engineers are studying the feasibility of retaining public relations counsel, as result of a discussion at their second annual meeting at Tacoma, Wash.

The matter came up in a discussion on whether the code of ethics needed revision. The conclusion was that such revision was not necessary, but that there was ground for improvement in the engineer's economic status. In this connection, the Seattle section suggested a public relations program to sell the civil engineer to the public.

The program now is under investigation, with the possibility other engineering groups may be invited to join. It probably would include some sort of employment agency for engineers.

Thomas Campell, associate professor of civil engineering at the University of Washington, Seattle, was advanced from vice chairman to chairman of the conference. Guy H. Taylor, member of the Portland, Ore., consulting firm of Moffatt, Nichol & Taylor, became vice chairman, and Robert O. Sylvester, assistant professor of civil engineering at the University of Washington, secretary-treasurer.

F. E. Howard of Kansas City, president of the American Society of Civil Engineers, was principal speaker. The conference was attended by delegates from the Seattle, Spokane, Tacoma, Portland and Montana sections and the Columbia Valley subsection. Charles E. Andrew, chief consulting engineer for the Washington Toll Bridge Authority, served as moderator on a series of descriptive talks on topics related to the Tacoma Narrows suspension bridge, after which a field trip was made to the bridge.

•

G. L. Sitton resigns as president of AREA

George L. Sitton, assistant chief engineer of the Southern Railway System, has resigned as president of the American Railway Engineering Association because of ill health. Sitton was elected president in March at the time of the association's annual meeting. (ENR March 30, p. 21). At that time he was too ill to attend.

H. S. Pacific, assistant chief engineer of the Great Northern Railway, is acting vice president of the association, has taken over Sitton's duties.

Chapman and Straus hail USBR Engineering Center

The Reclamation Bureau's Engineering Center at Denver is complete and ready for dedication ceremonies scheduled for July 20.

"In a very definite sense," Interior Secretary Chapman declared, "Denver has become the water engineering capital of the world. A large number of foreign engineers are visiting the Engineering Center to learn Reclamation-developed techniques as a help toward putting to use their own water resources."

Accelerated gathering of new talent and equipment began the moment the war ended, Reclamation Commissioner Michael W. Straus pointed out. Building on a prewar and wartime nucleus, the skills and facilities needed to carry out the bureau's responsibilities are now complete to the extent technical advancement permits, he said.

"The last large item of equipment was a 5,000,000-lb capacity testing machine," Straus added. "One year was needed for its installation, but it's now in use and is beginning to show the way to economies in selection of materials for our large dams and canals. Equipment of this sort symbolizes the purpose of the bureau's research laboratories.

"The laboratory experts and the design experts make an unbeatable team," he said. "Together they are tackling the toughest problems associated with tremendous work projects such as Hungry Horse Dam and the Grand Coulee pumping plant. No other country in the world can equal that team's experience, equipment and plain engineering genius."

Numerous members of Congress interested in Reclamation will be invited to attend the July 20 ceremonies in Denver.

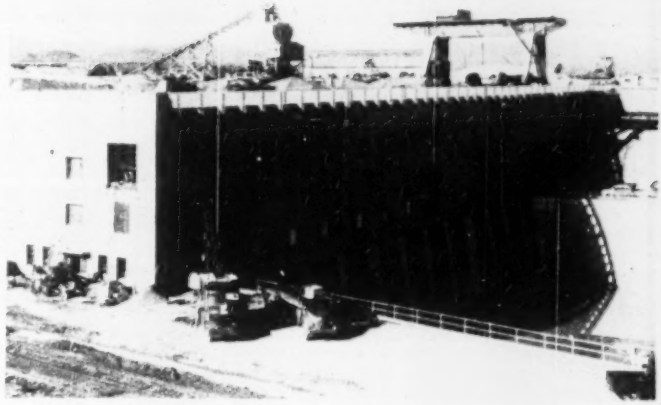
Board of Trade stuff

Arizona contractors lose fewer days per year to weather conditions than those of any other state, they say.

According to Joseph P. Condrey, executive secretary of the Associated General Contractors of Arizona, the state's weather loss averages only 10 work days a year.

This contrasts with months in other sections of the nation.

Condrey said that on two typical Arizona jobs, the Vinson Construction Co. lost two work days to weather on a 13-month bridge contract, and Arizona Sand and Rock Co. lost three days in six months on a highway job.



WATER FOR CENTRAL VALLEY—Here's the Tracy pumping plant, a Bureau of Reclamation structure which will raise 4,600 cfs of water 200 ft from the Sacramento River to a canal through which it will flow 120 mi to the San Joaquin valley. Six pumps will be powered by 22,500-hp electric motors.

Virginia polluters face crackdown

Virginia is ready to crack down on stream pollution procrastinators. Using soft words of unmistakable meaning, Chairman E. Blackburn Moore, of the state Water Control Board, told the Interstate Commission on the Potomac River Basin at its spring meeting that the board will move to "encourage" compliance and apply "more persuasion" to violators.

Virginia's control act will have been in effect four years July 1. It requires that the board judge each pollution case on its own merits—not on the basis of any area or stream program. The board has developed a complete record on each stream polluter in the state. Each has been certificated as to its pollution load of July 1, 1946.

• **No increase allowed**—No source legally may increase its pollution discharge beyond its certificated amount. In addition, the law gives the board authority to order treatment of pollution injurious to public health.

Progress under the act, Moore said, includes 58 new treatment plants put in operation, 20 of them by industry. Fifteen more are under construction, three of them industrial. Plans for another 21 are in preliminary preparation—a process that takes more time than most people realize, Moore pointed out.

Any new industry has to supply proper treatment before it can get water for its plant, Moore added. This rule has applied equally to 22 new industries that have come into the state and to 11 that have expanded existing plants since the middle of 1946.

Moore believes the present law is strong enough to meet the needs.

• **Improvement sought**—A number of communities and industries in the state have been put on notice to improve their pollution conditions, but no orders have been handed down yet to these violators. Three of the communities lie across the Potomac from Washington—the city of Alexandria and the counties of Arlington and Fairfax.

Representatives of these three engaged in lively panel discussion at the opening session. Criticizing proposals for joint sewage treatment, R. W. Watt, director of public service for Arlington County, said that the treatment costs of unified sewage disposal for the area would be so high as to wipe out any potential savings. Arlington, he declared, plans to go ahead with enlarging its present plant, but the county is ready to listen to any feasible solution of the sewage problem.

Mayor Franklin Backus, of Alexandria, spoke in favor of a joint project, but he declared the city could do nothing itself until the other communities either agree to cooperate or go ahead with solving their individual disposal problems. A motion picture illustrated the foul condition of the open sewers in and around the city.

Fairfax County, according to James Corbalis, sanitary engineer, will soon advertise a $3,000,000 bond issue for sewer construction and more important for a sewage treatment plant that will take care of present and future needs in the county's largest area, Sanitary District No. 1.

CONSTRUCTION BUSINESS

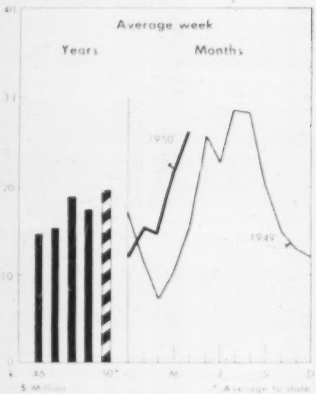
Road construction to top '48 high's 1950 contracts 56% above last year

By year's end, U. S. contractors probably will have done 25% more construction business than last year and 42% more than they did in the record year, 1948.

On that basis, 1950 should top out at around $11 billion worth of road contracts put under construction.

A rush to let highway contracts early in the Winter and Spring has pushed volume 56% higher than a year ago. Cumulative volume of contracts reported by Engineering News-Record to date this year is $392,169,000, compared to $240,888,000 in the same period a year ago.

Streets and Roads



Yet, in the first quarter of 1950, more new work was proposed than was taken out of the backlog and put under contract; the backlog actually gained 1% in the first quarter.

Here's why. Keys to the situation are two. Keen competition among contractors has driven prices down to a point where state and local authorities tend to economize to take their plans off the shelf and get them under way; cost of new road use up 7% in March over a year ago, up 40% since 1941, according to the U. S. Bureau of Public Roads. Keeps demand for new or improved roads a little better than even with supply.

In 1949, the first four months gave a good indication of the trend for the whole year. Thirteen April contracts were 21% of the year's total—$807,288,000. But this year, the seasonal pattern seems altered as the states and local governments rush to take advantage of the competitive bidding situation.

The high rate of contract letting early this year has been most notable in the east: In the first four months, New England road contracts were $30,000,000, 535% above a year ago; Middle Atlantic states, with $93,000,000 were up 147%; the South was up 112%, at $74,000,000.

West of the Mississippi, highway contracts were up 48% from a year ago, at $84,000,000; the Far West was up 16%, to $52,000,000; the Middle West was down 18%, to $22,000,000.

Toledo wages up 12½¢

Construction workers got a 12½ cent wage boost effective May 1 for one year in Toledo, Ohio.

New rates are: bricklayers $2.72½ an hour; carpenters $2.42½; electricians $2.62½; painters—$2.27½; plasterers, $2.62½; plumbers $2.62½; and common laborers $1.82½.

Chicago workers get wage hikes, welfare benefits

More than 50,000 construction workers in the Chicago area have obtained wage increases of 5-10 cents an hour. Welfare benefits went to some trades including laborers.

This is the first common labor welfare plan for any U. S. city.

Increased costs for employers come to 10 cents for most crafts, about 7½ cents for bricklayers and hoisting engineers.

New agreements provide:

Laborers get a 5 cent wage hike to $1.85 effective June 1, plus 5 cents more for a new welfare insurance program.

Hoisting engineers get 5 to 10 cents an hour, increasing the basic scale to $2.50 effective June 1. No welfare benefits were negotiated because of the difficulty of administration.

Carpenters get 5 cents an hour, raising them to $2.50. They also obtained 5 cents an hour more for a welfare insurance fund, with benefits beginning June 1, 1951.

Bricklayers keep their old scale of $2.35 an hour, but employers will contribute 7½ cents an hour toward a welfare insurance plan.

Painters got 10 cents an hour more. This increase to $2.47½ is retroactive to April 1, with no welfare benefits.

Bridge construction holds up strongly

Bridge construction business—always a close corollary of highway work—held up well in the first quarter of 1950, a check of ENR-reported figures showed last week.

Bridge construction contracts so far this year are running just 1% under 1949's all-time high. Volume to May 11, 1950, is $117,222,000. And the builders were making hardly a dent in the backlog of proposed work.

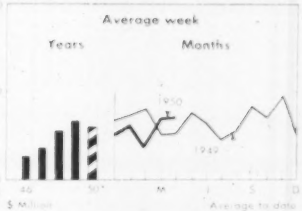
That backlog, as of March 31, totalled $1,488,211,000—more than enough to return the bridge builders to four years at the rate they worked in 1949. And last year, only 27% of the bridge contracts actually let came out of the backlog, the rest going into construction without earlier lineage as proposed work.

Indications of continuing good business can be drawn from the backlog. Last year, when construction was at its all-time high, the backlog gained by $104 million, or 7%.

Several of the larger bridges proposed since the first of the year are: $30,000,000 Inner Belt Bridge in Cuyahoga County, Ohio, to replace the Central Viaduct to West 14th Street; $8,500,000 concrete pontoon bridge across Lake Washington, near Seattle; and a $6,000,000 second bridge across the Columbia River between Pasco and Kennewick, Wash.

• **Post war trend.** Bridge construction didn't hit its stride until last year, when contracts rose to a record $857 million. Up until then, there weren't enough engineers or materials.

Bridges



Value of bridge contracts has averaged 2% as large as highways over the past 23 years. But bridge contracts last year were 4% as important as highways in dollar volume.

So far this year, bridge contracts are a more normal 2% of highway construction, as highway contracts zoom to a record high while bridges hold even with last year.

BIDS AND BIDDERS

(Major project news received after Construction Reports, page 35, went to press.)

Roads and Bridges—New Jersey Turnpike Authority, Trenton, N. J., awarded $22,848,795 contracts for constructing roads and bridges. Among the larger projects was Hackensack River Bridge superstructure, Contract 17, awarded to American Bridge Co., New York, N. Y., at $5,326,890; constructing road in Secaucus, Hudson County, Contract 18 to George M. Brewster & Sons, Inc., Bogota, N. J., $6,890,082; and Passaic River Bridge superstructure, Contract 20, to Bethlehem Steel Co., in Bethlehem, Pa., $7,288,810.

Bond Issues Approved—Voters of Oklahoma City, Okla. approved by large majority all bond issues submitted May 9, including $10,048,000 for water-system improvements, $6,500,000 for traffic arteries, $4,540,000 for sanitary sewers, $2,750,000 for storm sewers, $2,775,000 for flood control and $2,100,000 for parks. H. C. Chase is city engineer.

Gas Line—J. J. Raney & Sons, Little Rock, Ark., plans constructing gas line across the Mississippi River to serve Arkansas and to install distribution system in fourteen or more municipalities in Eastern Arkansas. Estimated cost is $12,000,000 to $14,000,000.

Veterans Hospital—Bids will be opened July 25 for $12,000,000 Veterans Hospital at Oklahoma City, Okla. Veterans Administration, Washington, D. C., will take bids.

Randall Dam and Mohawk Canal Projects—Western Contracting Co., Sioux City, Ia., was low bidder for constructing Stage 3, Randall Dam in South Dakota at $7,205,806, which U. S. Engineers, Omaha, Neb., opened bids May 10. Western was also low bidder May 9, for earthwork, concreting and structures for Mohawk Canal, Welton Gila Project, in Arizona at $2,412,045. These bids were opened by the Bureau of Reclamation, Yuma, Ariz.

State Buildings—Department of Institutions and Agencies, State of New Jersey, Trenton, received $25,000,000 appropriation for constructing and reconstructing New Jersey State Institutions. Bonds will be issued to cover cost. Plans are not yet underway.

Library—University of Wisconsin, Madison, Wis., will open bids June 23 for $5,000,000 Memorial Library. Phillips & Eble, Milwaukee are architects. R. C. Kirchoff, Madison, is state architect.

Roads—Department of Public Works, State of New York, Albany, received low bid for improving road in Steuben County from Bero Engineering & Constructing Co., Buffalo at $1,002,547 and road in Oswego County from Amte Brothers, Inc., New Britain, Conn., $1,251,980. The department also awardee a contract for improving road in Parksville, Sullivan County to John Arbocco, Inc., Poughkeepsie, $1,366,135.

Apartment—Marvin L. Warner, Warner Center Co., Birmingham, Ala., plans apartment in Indianapolis, Ind. to cost about $3,500,000. Plans are underway by Russ & Harrison, Indianapolis architects.

Grain Elevator—Henry George & Son, Spokane, Wash. has been awarded contract to build grain elevator at Vancouver, Wash. for Great Western Malting Co., Manitowoc, Wis. Estimated cost is $1,000,000. F. F. Carter, Vancouver, B. C. is engineer.

Office—Marani & Morris, architects, Toronto, Ont., will take bids June 5 for office building in Toronto, Ont. for Manufacturers Life Insurance Co., Toronto, Ont. Cost will be about $5,000,000. W. Carruthers & Associates, Toronto, are engineers.

Chief Joseph Dam—Peter Kiewit Sons' Company, Seattle, Wash., was low at $2,176,815 for excavation for north abutment, cofferdams, unwatering and constructing impervious blanket for Chief Joseph Dam, near Bridgeport, Wash. When U. S. Engineers, Seattle, opened bids May 12.

Housing—City of Little Rock, Ark., approved housing projects and slum clearance to cost about $10,000,000. Wittenberg, Delony & Davidson, Little Rock, are architect.

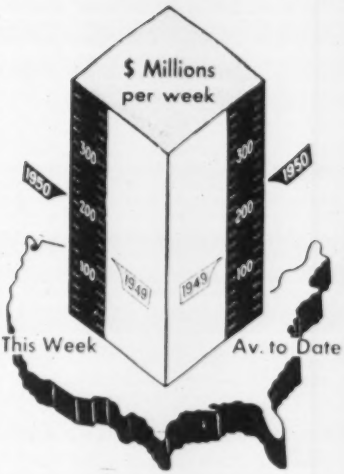
School—Vallejo Unified School District, Vallejo, Calif., approved $2,548,000 bonds for schools.

Pennsylvania State Highway—Pennsylvania State Highway Department, Harrisburg, Pa., received low bid from Keelor Construction Co., Perkiomenville, at $1,620,671, highway in Westmoreland County from Latrobe Road Construction Co., Latrobe, $1,589,263. State Highway Department also awarded contract to S. W. Winkelman Co., Inc., at Syracuse, N. Y., for projected road in Lackawanna County at $1,745,405.

COSTS AND VOLUME

ENR INDEX NUMBERS

Index Base — 100	1913	1926
Construction Cost ..... May '50	496.55	278.69
Building Cost ..... May '50	567.27	196.91
Volume ..... Apr. '50	287	170



Activity This Week

As reported to ENR (in millions of dollars)

Amount of contracts let

	This Week	Cumulative 1950	Cumulative 1949	% change
	Week of May 18	120 wks.	120 wks.	
	1950			
Federal	$ 42.9	$ 542.7	$ 468.8	+16
State & Mun.	92.6	1,284.6	1,284.3	+24
Total Public	$134.6	$1,827.3	$1,753.1	+4
Total Private	102.9	2,316.2	1,279.9	+81
U. S. Total	$100.9	$1,420.2	$2,810.2	−11

Contracts by type of work

	This Week	Cumulative 1950 120 wks.	Cumulative 1949 120 wks.	% change
Waterways	$ 4.0	$ 85.7	$ 61.1	+40
Sewerage	5.4	88.2	94.0	−6
Bridges	20.2	132.3	159.8	−17
Highways	28.4	420.2	266.8	+61
Earthwork				
Waterways	1.1	142.1	225.6	−37
Buildings:				
Public	29.4	237.6	605.2	−61
Industrial	7.9	41.0	214.5	−81
Commercial	27.8	137.2	382.1	−64
Fireproofing	4.5	22.6	23.1	−2

NOTE: Missouri River projects included are: Waterworks and sewerage, $3,000,000; levees, $3,500,000; other public works, $20,000; industrial buildings, $58,000; other, $4,000; bridges, $2,000.

New capital for construction

	Cumulative 1950 120 wks.	Cumulative 1949 120 wks.	% change
Corporate Securities	$672.9	$1,034.7	−35
State and Municipal:			
Pub. Housing	81.4	219.2	−63
Housing	244.5	304.9	−20
Total Capital	$1,288.8	$2,008.8	−36

Cost is the chief obstacle in obtaining . . .

Fresh Water From the Sea

THE CHALLENGE of "Water, water, everywhere, and not any drop to drink" which caused Aristotle (in 350 B.C.) to describe methods of extracting fresh water from the sea, is attracting some high-level thinking.

Few years go by but what Patent Office lists reflect hopeful applications for some gadget or combination of gadgets that will free sea water of its salt.

But what is happening now is different. It is given perspective by the fact that Congress has been asked "to conduct research and to construct, maintain and operate one or more demonstration plants to produce fresh water suitable for municipal and irrigation uses from sea water." Obviously, something important could develop from such a setup, but just as obviously from facts now known about the disproportionate cost of sea water distillation because of the necessary prodigal use of fuel—revolutionary results are far from probable.

The origin of the new interest in water from the sea is not hard to fathom. Higher standards of living, greater industrialization and more intensive agriculture have increased water demand enormously. Rapid growth of cities in both arid and non-arid parts of the world has strained available supplies. "More water," the imperative cry that summoned Ganga Din, is heard now even in New York. And in California a "water ceiling" limiting expansion of industry and agriculture, is only 25 years away, even assuming conservation of all flood waters on all streams within the state. It is for this reason that in a state already utilizing runoff from the Colorado River Basin, the Bureau of Reclamation presently is studying the feasibility of importing water from the Columbia River. California, in common with other thirsty regions, must consider all promising methods of obtaining new water sources.

• **Sea is source of all water.** Any new supply must come, directly or indirectly, from the sea. "Nature's method of replenishing water supplies is by evaporating moisture from the ocean and precipitating it on the land. Man can imitate or supplement this natural process in several ways. He can increase precipitation from clouds by use of silver iodide or ice pellets, or he can tap the ocean source directly, robbing sea water of unwanted salts by distillation, by chemical and electrical processes, by freezing out fresh ice crystals.

Where rain is sufficient and when cost can be disregarded there is no problem—witness the fact that enough distillation units were produced in this country during the war to supply pure water for the daily needs of a million men. Units of large size have also been found practical, notably those used for nitrate mines in Chile, at Curacao, Dutch West Indies, population 45,000; and those now being installed for producing 720,000 gpd in the Persian Gulf. (ENR Aug. 11, 1949).

Distillation has thus been used where it is economically feasible to be prodigal with energy to pay whatever it costs to get water. But such locations are few, and only domestic water even there can be supplied. Industry and agriculture cannot be supplied with fresh water from the sea unless and until lower-cost methods can be found.

• **Atomic power not the answer.** As needs become more urgent, of course, higher prices will be paid for pure, soft water. But there is yet a long way to go in cost reduction. Fuel is such a dominant factor in distillation costs that there is a tendency to optimistic assumptions about atomic energy being the final solution of the problem. But power from atomic

COST OF EXTRACTING FRESH WATER FROM THE SEA

Estimates Compared with Cost of Water from Natural Sources

	Cents per ton	Cents per 100 cu ft	Cents per 1,000 gal	Dollars per acre-ft	Source of info and Remarks
Estimates on Purified Sea Water					
Partial Costs*					
Compression distillation. Fuel only	12.9	40.2	54.7	175.00	J. J. Campobasso, "Distillation of Sea Water by the Vapor Compression Method." Jour. AWWA, May '48
Three effect stills. Fuel only	25.7	80.0	107.0	350.00	
Single effect stills. Fuel only	62.1	194.0	260.0	850.00	
Electrolytic process. Power only	51.6	65.3	90.0	290.00	
Demineralization by ion exchange. Chemicals only	600.0	1,870.0	2,500.0	8,000.00	W. W. Aultman, "Fresh Water from Salt," Eng. & Sci. Monthly of the California Institute of Technology, Feb. '49
Total Cost					
Compression distillation	70.0	93.5	125.0	400.00	
Demineralization by ion exch.	70.0	93.5	125.0	400.00	
Actual Costs, Natural Water Supplies					
East Bay Mun. Util. Dist.	1.84	12.0	15.9	52.27	East Bay Mun. Util. Dist. Treated water, wholesale plus some delivery cost
Avg. for 404 U. S. Cities	3.74	11.8	15.7	50.90	AWWA "Journal," Oct. '48
S. F. Mun. Water System	1.90	10.0	13.3	43.52	S. F. Water Dept. Lowest wholesale rate
Met. W. Dist. So. Calif.	2.16	6.75	9.0	30.00	Met. W. Dist. of So. Calif. Treated water, wholesale, without local delivery costs, aqueduct partly completed
Water from Calif. Cent. Val. Proj.					
City of Richmond	1.21	3.77	5.0	17.45	City of Richmond. Proposed industrial raw water, canal side
City of Vallejo	1.00	3.11	4.15	13.55	City of Vallejo. (Estimated) Raw water, canal side (via Monticello proj.)
Class 1 (Ferm. water)	0.198	0.62	0.824	2.70	1947 contract basis. To irrigation projects

* Mr. Aultman points out that allowing for pumping from sea level, labor, interest, amortization, load factor, distribution, etc., actual year-round costs could total more than three times bare fuel, power or chemical costs. Fuel costs on basis of diesel oil at $0.095 per gal and bunker fuel at $1.30 per 42-gal bbl.

fission does not now, nor is it in the near future likely to, meet this need.

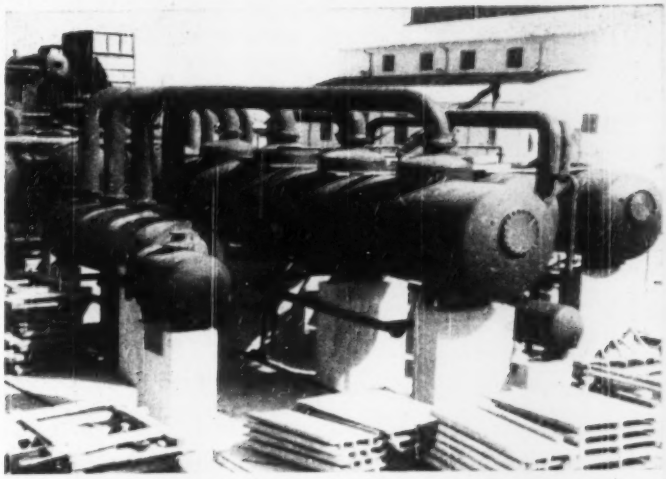
Voicing the belief of atomic scientists on this point, Dr. L. A. Du Bridge, president, California Institute of Technology, says, "I am inclined to believe that 30 to 50 years will elapse before uranium can possibly become a major source of power." And it add when it is available, "Including both plant investment and fuel costs (neglecting vast development costs), uranium power will certainly cost much more than power from coal."

• **Dreamy ideas**—With the experience of wartime and with plants whose size is far beyond the experimental, the technology of sea-water distillation has made progress, yet there is much waste motion in the development and a lot of dreamy ideas. If false leads could be eliminated early, much time would be saved. Speaking of a wholly untried theory proposed in Los Angeles recently that would get rid of salt in sea water by electrical impulses, an observer commented, "There is need—for some 'central' agency equipped to thoroughly assay the thousands of ideas about sea-water conversion that continually crop up. By the law of averages there should be at least one good, workable idea in even ten thousand tries."

Perhaps such an agency as the one proposed by the Bureau of Reclamation, could test and eliminate at least some of the less practicable ideas. Its proponents feel that its advent could be one of the stepping stones in the quest for general economic practicability of the process. In the meantime developments are being gradually recorded.

• **Evaporators improved**—The efficiency of evaporating stills in the compression distillation process is greatly increased by using several successive stages, as in the so-called "multiple-effect process". In this method the condenser of the first stage is the boiler of the second stage, from which steam at lower temperature and pressure issues to be picked up in a succeeding stage. This can be continued so long as sufficient temperature differentials age available to produce economical rates of heat transfer.

Notable progress has been made in dealing with scale formation which has been a major operating problem in sea-water stills. When brine is raised to the boiling point, scale deposits build up rapidly and heat exchange rate falls off accordingly. "Objectionable" scale deposit has been common after 300 to 500 hr of operation. A 700-hr operating period



BIGGEST Sea Water Evaporation Plant is now under construction by Kuwait Oil Co., on Persian Gulf. Six of these three-effect evaporators will furnish 720,000 gpd. Oil fuel is cheap, other drinking water non-existant, so water expensive by usual standards is acceptable. (Westinghouse Electric International Company photo.)

has been about the maximum between shutdowns for scale removal to prevent output from falling to less than 50% of the rate possible without scale.

Research on this problem under direction of W. F. Langelier, University of California, has shown that magnesium hydroxide, calcium carbonate and calcium sulphate are the most troublesome compounds and that these can be controlled by mechanical rather than chemical means. Essentially, the plan is not to prevent scaling but rather to cause deposition from hot brine to take place in a "contact unit" or stabilizer from which it can be flushed out easily without interrupting operation of the evaporator.

In repeated tests, one of which was continued for 5,000 hr, scale deposits were held to less than 10% of what they had been without use of the stabilizer. These test runs were mostly on small units, but a vapor compression unit designed to produce 25,000 gpd, equipped with the stabilizer, was given a test run recently and, as this was written, was being shipped to Bermuda for service there.

R. V. Kleinschmidt, an expert on distillation, has estimated some very low fuel costs on large multiple-effect stills (Water Purification for Ships—ASME Dec. 1947) but there is a lack of information on other important cost elements in operation of large plants. Because such plants would be at sea level, pumping would be an item, and plant costs would increase sharply as the number of stages goes above two. Incentive for a number of stages lies in economy of operating costs; efficient six-effect systems require only about one-sixth the power and heat used in a single-effect evaporator.

Three principal elements make up the compression distillation plant: compressor, evaporator and heat exchanger. In the portable-type equipment used by Army and Navy, optimum performance appears to produce between 175 and 200 lb of water per pound of fuel, including fuel needed to drive the compressor for transferring steam from stage to stage. For each 1.25 lb of sea water at 60 deg F fed to the system there is produced 1 lb of fresh water at 70 deg F and 0.25 lb of brine at 80 deg F.

Introduction of positive-displacement rotary compressors in relatively small distillation units stepped up production per pound of fuel to the 175- to 200-lb figure mentioned in the foregoing. It has been suggested that the application of high-efficiency axial-flow compressors similar to those used in gas turbine units would still further increase the efficiency and reduce initial cost.

Commenting on the subject of fresh water from the sea in addressing the California Section, AWWA, Everett D. Howe, associate dean, College of Engineering, University of California, recently pointed out that Roots-type blowers used as vapor compressors have not been satisfactory where the unit output is much larger than 7,200 gpd. However, "considera-

tion is now being given," he said, "to a unit of the vapor-compression type that would be rated at 240,000 gpd."

• **Other possibilities**—He also referred to the thermal-differential plant of Georges Claude, designed to derive energy from temperature differences in sea water at the surface and at great depth. Differences up to 40 deg F can be found where submarine canyons 500 meters deep are near shore. A pilot plant in Cuba found "conditions unsuitable." A second plant being constructed by the French at Abidjan (French West Africa) proposes simultaneous development of 10,000 kw and 150,000 gpd of distilled water.

Prof. Howe also mentioned a solar still on the Virgin Islands, designed by Dr. Maria Telkes of MIT, in which sea water is pumped to a high area of the island and evaporated in 125 small units at the rate of 1,000 gpd. Under solar heat these units will produce about 1 gal of water per day for each 4 sq ft of concrete surface in the evaporator trays.

• **Cost comparison table**—Distilled water production costs of only a few cents per ton convey the impression of a low price. This cents-per-ton unit is not used to deceive, but because it is the usual unit of measurement in boiler practice where calculations deal with Btu values, and the tables and formulas refer to heat transfer and rates of evaporation. Similarly, potable supplies are commonly measured by water meters, the only available cost figures from that field are in terms of cubic feet or thousands of gallons. For irrigation practice, the unit is the acre-foot.

To facilitate comparisons, therefore, the accompanying table was compiled with all costs reduced to equivalent values in all three fields—boiler practice, metered water services and irrigation. The conversion units used were 6,250 lb for the weight of 100 cu ft of water, 1,361 tons for 1 acre-ft of water.

• **Obstacles to be overcome**—Chief obstacles to lower costs in obtaining fresh water from the sea were brought out in a recent survey of the subject by W. W. Aultman, water purification engineer, Metropolitan Water District of Southern California.

Best operating results from vapor-compression units of present-design produce 200 lb of water for each pound of fuel (17 gal to 1 gal). At this fuel efficiency, the distillation of 1,000,000 gal of fresh water from the sea would require 5,650 gal of diesel oil or equivalent. At the lowest price presently quoted for this fuel (9.5¢ per gallon fob El Segundo, Calif.) the cost would be 53.7¢ per 1,000 gal for fuel alone.

To this must be added labor to operate and maintain the stills, which will vary greatly with the size of the installation. With load factors usual in year-round operation of water-producing plants, and such other items as interest, amortization, depreciation and charges for pumping—since the water is produced at sea level—the total cost will be in the neighborhood of $1.25 per 1,000 gal delivered wholesale to a local distributing agency. This does not include the cost of distributing the water to the local consumer. This wholesale cost is about fourteen times the present cost of softened Colorado River water delivered by the Metropolitan Water District in southern California.

To produce 1,100,000 acre-ft of potable water a year—the designed capacity of the Colorado River aqueduct—would require slightly over 2 billion gal (48,200,000 bbl) of diesel oil, or equivalent, which is one-quarter of California's annual fuel oil production. Even when larger distillation units are built, the water-to-fuel ratio of 200 to 1 will not be materially improved, for the efficiency of heat recovery is already very high. The foremost design and research engineers of this type of equipment in the United States state that "it appears very unlikely that costs can be reduced to less than half of the present cost."

• **Chemical processes**—Development of organic anion and cation exchangers has made possible complete demineralization of water, and such methods are now used in various industries where water treatment is but a small part of the whole process and when waters of relatively low mineralization are available as a raw supply. However, the unit cost of demineralization by these processes is directly proportional to the salinity of the water treated.

Remembering that sea water carries some 36,000 ppm total dissolved solids and assuming a fair average operating efficiency, the cost of regenerating chemicals alone (acid and soda ash or caustic soda) required to demineralize sea water at current chemical prices in southern California would be about $25 per 1,000 gal or more than $8,000 per acre-foot.

The consideration, however, that completely eliminates these chemical processes for this purpose is that, if used for treating sea water, they require 20 to 50 times the amount of demineralized water produced just to wash the regenerating chemicals from the demineralized product.

• **Electrolytic method**—Aultman analyzes the Robert E. Briggs electrolytic method of producing potable water from sea water and finds that with power at 5 mills per kilowatt-hour the cost would be $0.90 per 1,000 gal or $293 per acre-foot in addition to the requirement that 5,000 gal of water be pumped for each 1,000 gal of potable water produced. It would require twelve times the output from Hoover Dam to produce the 1,100,000 acre-ft of water to be delivered by the Colorado River aqueduct.

On the subject of fresh water obtained by freezing sea water, Aultman points out that this process would probably cost at least $1.25 per 1,000 gal or $400 per acre-foot.

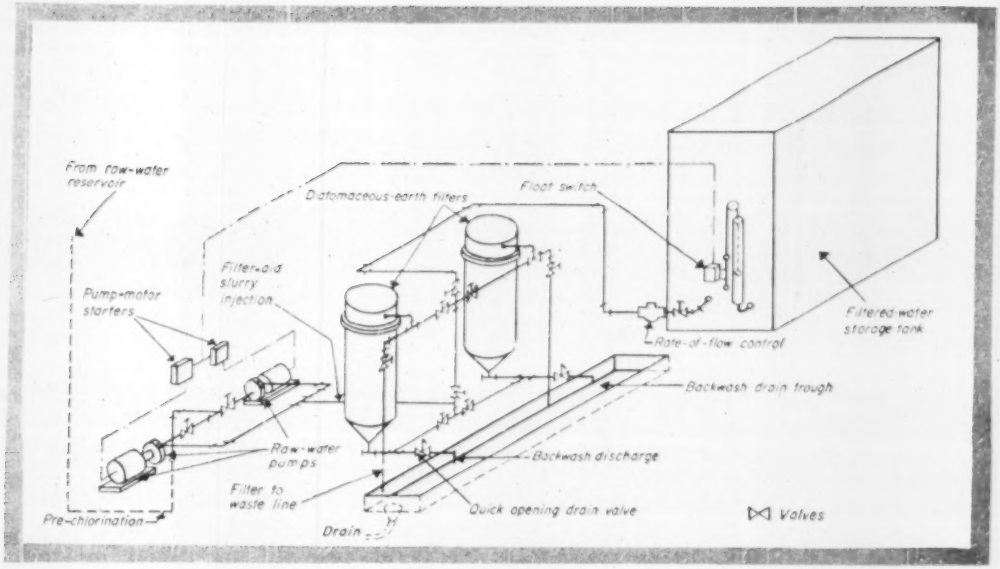
From an engineering standpoint, Aultman concludes, there is no question that fresh water can be and is being produced from sea water. But within the foreseeable future there appears to be little or no possibility that it will be economically feasible to turn to the ocean as the source of domestic, agricultural, or industrial water along either coast of the United States. Research investigations that might be assigned to the Bureau of Reclamation by Congress may do much toward a clearer understanding of the problem, Aultman believes.

Cities Experimenting with Fluoride

Morristown, N. J. recently became the eleventh U. S. city to adopt fluoride dosage into its water supply in an effort to reduce tooth decay in children, the American Public Works Association reports.

Generally, such action has been on an experimental basis. Grand Rapids, Mich., was one of the first cities to inaugurate a carefully controlled study in 1945. Final definite conclusions are not expected for another six years.

A committee of well-known physicians and dentists in Kansas City, Mo., appointed by the city manager at the request of the council has reported that there is "no available direct evidence of the caries-inhibiting effect of artificial fluoridation of the water supply." Addition of sodium fluoride to the water supply would cost about $50,000 per year with an additional $10,000 installation cost the first year, the report noted.



DIATOMACEOUS-EARTH FILTRATION AND CHLORINATION are teamed up at Cherry Valley, N. Y. to produce a quality water for domestic consumption. (All illustrations by Proportioneers, Inc., Providence, R. I.)

Diatomite Filters Turn Out Safe, Clean Water

Edwin S. Pegg
Superintendent of Water
Cherry Valley, N. Y.

DIATOMITE FILTERS went to war and did first class service in turning out safe water for U. S. troops in the tropics. But there's been some wide-spread conscientious reluctance to adopt such units—often considered unproven—for treating city supplies.

But this technical inertia is now being broken down. Aggressive manufacturers have pushed forward to get better equipment and processing methods; a few waterworks managers and state sanitary engineers—who think ahead—have been progressive enough to give a fair trial to this promising method of water purification. These full-scale, pilot-plant trials have resulted in collection of data that prove diatomite filters can produce a safe, clean water consistently—with sensible supervision and maintenance.

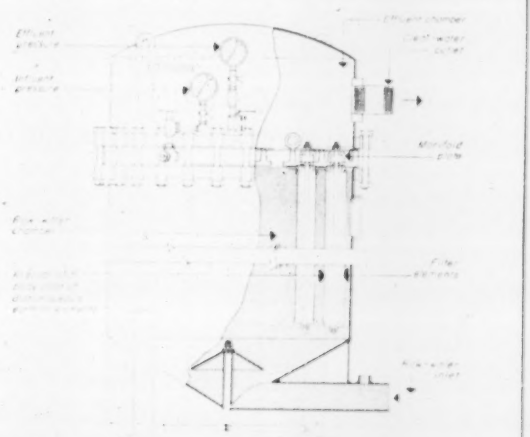
Another very good reason for putting diatomite filters to work is that they make possible lower construction costs. Costly concrete structures are unnecessary and building sizes can be reduced due to the small amount of space required for these units. This

WHAT IS A DIATOMITE FILTER?

A diatomite filter, essentially, consists of porous elements upon which a film of diatomaceous earth (deposits of siliceous skeletons of microscopic aquatic plants) is built up before and during filtration. The diatomaceous film performs a function similar to that of the sand in rapid filters. It strains out impurities, such as turbidity-forming particles and bacteria.

The diatomite filter consists of a closed cylindrical tank divided into a raw water chamber at the bottom and a clear-effluent chamber (smaller) at the top. From the separating manifold plate, hollow, porous cylindrical elements are suspended into the lower compartment. Diatomaceous-earth slurry—which builds up on the elements—is first injected (precoat) and then fed continuously (body coat) into this compartment as raw water is pumped upward through the unit under pressure. Clean water is drawn off from the top of the tank.

Backwashing is accomplished by water under pressure delivered through the clear-water chamber. This knocks off the dirty film, which is wasted.



SECTION through filter element. Turbidity particles in filter cake are separated by body feed, allowing passage of water.

makes diatomite filters attractive to small cities with limited finances.

• **An example**—One of the first small villages (700 inhabitants) to look into and accept diatomaceous earth filtration is Cherry Valley, N. Y.

Built at a cost of $25,500–$36.40 per capita—this 0.25-mgd plant has been in full-scale operation for nearly seven months. And performance results are gratifying. Turbidities as high as 60 ppm in raw water have been experienced but the amount in the plant effluent has always been so little that it couldn't be measured. Total bacterial count in effluent samples has been consistently low and no coliform pollution was found by regular tests.

The plant is simple (see sketch). It consists of two relatively large vertical-cylinder diatomite filters, a chemical feeder with agitator-equipped slurry tank, two raw-water pumps, a flow-rate control valve and a chlorinator.

• **Operation**—The first step is to build up a precoat of diatomaceous earth (DE) on well-washed filtering elements. This is done by putting about 10 lb of DE into the precoat tank which is connected to the raw-water compartment of each filter unit. The precoat charge is then carried into the filter by a stream of raw water with the water pressure on the filters shut off.

Raw water from a small artificial reservoir is then forced through the filters by either or both of the 150-gpm pumps. Pump discharge—chlorinated at the rate of about 0.5 ppm—is delivered to filter inlets at 35 psi.

After raw water is supplied to a newly-precoated unit, the filter is run to waste for about two min. This builds up a DE filter-aid cake on the elements and disposes impure water.

With a uniform precoat built up, the chemical feeder is turned on and DE slurry is injected continuously as raw water is filtered. Continuous delivery of this filter-aid slurry during filtration forms what is called a "body feed." This coat is said to collect impurities in expanding layers and at the same time to permit longer filtration periods by reducing clogging.

Plant discharge is to a clear well and into the distribution system which includes a service reservoir. Total storage capacity is 0.25 mg. Excess of treated water backs up into the reservoir. During filter washing, domestic supply is drawn from the reservoir.

Operation of the plant is controlled by a float switch in the reservoir, connected to pump motors.

With newly washed filters, influent pressure is nearly 35 psi and effluent about one pound less. Effluent pressure is dissipated in from two to five days of filtering, depending upon condition of the raw water. It has been found that it is better practice to wash filters at about 50 psi loss than to delay for zero effluent pressure.

• **Backwashing**—Dirty filters are backwashed by pumping raw water into the effluent chamber and backward through the elements. This is done by the plant pumps. The volume and pressure of this flow knocks the dirty layers of compacted filter aid off the elements. This mixture is wasted.

Backwashing consumes much less water than that needed for equivalent capacity sand filters. Each filter—with an effective area of 94 sq ft—uses about 1,100 gal of cleansing, 650 gal for backwashing, 150 gal for rinsing and 500 gal for precoat filtering to waste.

The plant is operated for $4.51 to $6.87 a day. Cost per 1,000 gal of water filtered is about $0.03. (Table II).

• **Behind the project**—Water from a shallow, organic-matter-laden reservoir was formerly treated on one 25-yr-old slow-sand filter with a clear well. When the filter was cleaned, raw water—without filtration—was delivered directly to the community. This fact concerned the N. Y. State Department of Health—particularly as the pattern of laboratory-test results grew progressively worse. Coliform organisms were found in more than half the samples examined.

Although the Department's engi-

TABLE I—DESIGN AND ENGINEERING DATA

Water Characteristics: Raw water taken from an impounding reservoir is moderately hard with pH about 7.8. Considerable turbidity present during heavy runoff. Large amounts of algae present during hot weather. Treatment: Pre-chlorination of raw water and filtration through diatomaceous-earth units.

Capacity: Average—125,000 gpd; Maximum—250,000 gpd; Building planned for doubling plant capacity without enlarging structure.

Chlorinator: One semi-automatic chlorinator. Maximum capacity—4 lb per 24 hr.

Pumps: Two 150 gpm at 80-ft total dynamic head, close-coupled units. Individual electric motor drives—5 hp, 220 v, 60 cycle, single phase. Gasoline engine standby with quick coupling device.

Slurry Feeder: One chemical feeder with 1/6 hp, 110 v electric motor. Stroking rate—13, 26 or 47 strokes per min by adjusting three-step cone pulleys. Stroke length adjustable while in motion from 0 to 12 cc per stroke. Maximum capacity—200 gph at 125 lb maximum head. Maximum slurry strength—5% for Celite 545 or Dicalite 4200; 10% for Hyflo Super-Cel or Dicalite Speed Plus.

Agitator Tanks: One unit each with 1,500 gal capacity; Material—plastic lined steel. Stirring equipment 1725 rpm agitator with 1/3 hp electric motor.

Filters: Two units each 3 ft in diameter and 8 ft high; each contains 94 sq ft of filtering area, 45 aluminum-oxide tube elements in each; 6-in influent and effluent valved connections. Filter tanks—plastic-lined steel shells tested to 100 psi. Filtration rates—at 150 gpm flow, 0.7 gpm per sq ft and at 300 gpm—1.4 gpm per sq ft.

Cost: Equipment and its installation—$15,500; building—$10,000; total $25,500.

Building: Two floors with 480 sq ft floor space. Construction—reinforced concrete and concrete block.

Equipment Manufacturers: Diatomite filters, slurry feeder and auxiliary equipment—Proportioneers, Providence, R. I.; chlorinator—Builders-Providence, Providence; rate-control valve—R. W. Sparling, Los Angeles, Calif.

TABLE II—SUMMARY OF OPERATING STATISTICS

(Nov. 1949–March 1950)

Month	Water Consumption (gpd)	Filter Aid Used (lb/day)	Chlorine Used (lb/day)	Electricity Used (kw-hr/day)	Operator Time (hr/day)	Daily Cost ($)	Cost per 1,000 gals. ($)
1949							
Nov.	137,500	36.9	1.94	92.35	1	$4.51	$.034
Dec.	178,032	36.5	1.80	101.5	1	5.60	.032
1950							
Jan.	182,000	39.5	1.43	99.3	1	5.50	.030
Feb.	183,000	30.4	1.30	96.8	1	5.17	.029
March	221,000	57.2	1.45	114.4	1	6.87	.031

neers frequently pointed out the desirability of water disinfection to protect public health, several propositions to authorize chlorination of the water supply were rejected by the voters.

The State Health Department then issued a cease and desist order, directing installation of chlorination.

The order was carried out. A chemical feeder for injecting sodium hypochlorite into the water supply was installed. But this proved to be highly unsatisfactory. Fairly strong chlorine and algae tastes and odors brought down bitter complaints from consumers as well as the officials. The city fathers then started a search for a feasible method of water treatment.

The situation offered an excellent opportunity to show what diatomite filters could do. And Proportioneers, Inc. of Providence, R. I. grabbed their chance. With the approval of the state department and the local water board, the company set up (at its own expense except for labor other than its own men) several portable units.

After several weeks of operation, it became apparent that the diatomite filters could effectively remove the heavily concentrated algae from this supply. This result brought authorization from all concerned to proceed with testing on plant scale.

• **Full-scale tests.** Two diatomite units, with sufficient capacity to satisfy the city's needs, were then brought to Cherry Valley and installed on the water system. Again Proportioneers took the long odds. They paid the cost (except for local labor), betting that the plants' performance would command a sale. And they won the bet. These units are now in the plant.

The two diatomite units were tested for several weeks at 150 gpm. flow. This was done to determine length of runs that might be expected between washings. Runs varied from two to six days, depending on rate of DE feed and raw-water condition.

Then the filters were put through their paces at 500 gpm. flow. At this flow, it was possible to produce a day's supply in 8 hr. But the length of filter runs decreased to about one-third of that for the 150 gpm. rate.

Turbidity removal was also checked. To create artificial turbidity, a fire hose was directed into the reservoir at the intake. And with 5,000 standard units of amorphous matter in raw water, the filter, for example, turned out an effluent with only 60 units. (See table III).

Removal of microscopic organisms was equally effective. The entire test chalked up 100% reduction.

The plant's performance carefully checked and evaluated—sold the State Department of Health on the reliability of diatomite filters for treating a municipal supply. Preliminary plans for a complete plant utilizing diatomite filters were drawn up. After approval of plans by the SDH, a proposition for a permanent filter plant was submitted to voters. They approved it by a vote of 5 to 1. It started operation in Sept., 1949.

• **Personnel credits.** Harold Rock is SHD's district engineer. Duncan Adair of Sendey, N. Y. prepared the plans for the plant. Schultz-Foster Associates, Inc. of Troy, N. Y. represented Proportioneers, Inc.

TABLE III—PILOT-PLANT OPERATING PERFORMANCE

(Aug.-Nov. 1948)

Date	Water Treated (1,000 gals)	Filter Aid Used (lb)	Bacteria (per ml) R	Bacteria (per ml) F	Coliform (MPN, per 100 ml) R	Coliform (MPN, per 100 ml) F	Turbidity (ppm) R	Turbidity (ppm) F	Total algae (Std. Units per cc) R	Total algae (Std. Units per cc) F	Total Iron (ppm) R	Total Iron (ppm) F	pH R	pH F	Amorphous Matter (Std. Units per cc) R	Amorphous Matter (Std. Units per cc) F	Color (ppm) R	Color (ppm) F
8 24	145	43	280	180	240	<2.2	T	T	175	none	.12	.08	7.8	7.9	1,500	14	14	10
8 25	125	35.5	1400	1	5	<2.2	T	T			.20	.06	7.9	8.0			15	10
8 30	125	35.5	2100	520	<1.8	<2.2	T	T	405	none	.25	.15	8.1	8.2	1,500	50	18	5
8 31	135	39	12,00	140	5	<2.2	T	T	525	none	.25	.08	8.0	8.0	1,450		18	5
9 1	120	32	240			2.2	<2.2	T	T			.04	8.0	8.0			16	7
9 28	119	33						10	T	150	none	.3	7.9	7.8	7.3	8,000	200	95	0
10 28	158	41	190	1	5	<2.2	48	T			.35	.15	7.7	7.9			10	7
10 29	139	46	100	1	5	<2.2	25	T	250	none	.14	.35	7.6	7.8	8,000	50	10	10
10 30	117	39	46	1	5	<2.2	1	T			.5	.08	7.5	7.7			12	5
10 31	120	42	61	1	2.2	<2.2	30	T			.45	.1	7.7	7.7			10	8
11 1	115	37	85	3	<2.2	<2.2	20	T	64	none	.35	.1	7.7	7.7	22,800	14	10	5
11 3	129	42	120	1	<2.2	<2.2	10	T			.5	.25	7.6	7.7			5	5
11 4	123	35	450	2	2.5	<2.2	20	T			.15	.04	7.7	7.7			10	8

R Raw water
F Filtered water
Less than

All filtered-water samples show less than 2.2 coliforms per 100 milliliter. A test of 2.2 is not satisfactory.

PART II OF A SERIES

Cost-Cutting Tips On Ohio Highways

- **Let private contractors do the work**
- **Standardize bridge plans**
- **Halt overloading**

DECLINING CONSTRUCTION PRICES is one of the most encouraging trends in our national highway picture today. This should be a healthy "shot in the arm" for the road building industry, since it offers a challenge to contractor and engineer alike to develop methods of stretching the roadbuilding dollar even further.

In Ohio both bridge and highway construction costs have taken sharp dips over the past several months, and contractor competition for work available is keener today than ever before.

The Ohio state highway department set out last year to step up the tempo of its road building and, at the same time, reduce the costs of construction. It has been successful in both.

Some of the first steps taken by the department were reorganization, recruitment of young engineers and improved planning and programming (ENR May 11, p 32). At the same time bridge and highway construction techniques were developed to speed the work and cut costs. How this paid off is shown in the accompanying table of 1949 prices versus those of 1948. The cost of roadway excavation dropped 30% during this period, waterbound macadam stayed about the same, but other contract items dropped from 5% to 20%.

Contracts awarded during the first two months of this year show further reductions in construction costs. Average unit contract prices on $1,480,000 worth of bridge and highway construction awarded during that period show reductions ranging from 2.2% for reinforcing steel to 14% for hot mix bituminous resurfacing, as compared with 1949 average prices.

• What brings costs down? Price reductions on Ohio highway construction are attributed to several things. Spirited competition among contractors to bid in the work, reflected by the large number of bids offered for most of the projects; greater work productivity, improvements in roads building equipment; development of multiple-purpose units that can be operated with less idle time; and more dependable supplies of material together with firm delivery prices.

The Bureau of Construction is headed by L. H. Wismar, chief engineer, and P. E. Masheter, assistant chief. Ed. Mesloh is office engineer. The organizational setup includes four traveling field engineers, and one specialist each on bituminous pavement and structures, all working out of the central office. Each division has a construction engineer, plus project engineers.

The department does no construction by state force account. It has found from experience that keen competition among contractors will give lower unit contract prices than could be obtained with state forces.

There is a noticeable and growing trend in Ohio toward mechanizing the construction of macadam pavement—both waterbound and bituminous. Two types of equipment credited with speeding this work and reducing its cost are: Self-propelled mechanical stone spreaders and vibrating spreaders that can key the aggregate full depth in a single pass.

These, and other improved types of equipment such as asphalt distributors and bituminous pavers, have had a great deal to do with reducing construction costs in spite of increased labor costs during the past year.

Pavement widening has been and is a major construction item in Ohio. Statistics show that the cost of widening eight mi of narrow pavement from 4- to 6-ft, and surfacing the entire roadway pavement with 2½ in. of bituminous surfacing is about equal to the cost of 1 mi of new highway construction—including grading, small drainage structures and 24-ft pavement.

One secret of the fast tempo of construction in Ohio is that each project is expedited to completion regardless of the size of the contract—by close cooperation between contractors and engineers. A great number of projects are completed ahead of schedule. For example, the million-dollar Eddy Road-street and freeway interchange in Cleveland—estimated to take two years for completion—was finished last fall one year ahead of schedule.

Ohio does not assess its contractors liquidated damages for failure to complete construction projects on schedule. The contractor is charged, however, all extra costs of field engineering and inspection caused by an overrun in time. He must also reimburse the state for the extra costs of maintain-

ONE FOURTH of Ohio's 9,690 bridges are either too weak or too narrow, or both.

ing detours after his contract time—adjusted for approved time extensions—has expired.

Neither does the department believe in withholding the usual 15% of all contract work in place until the job is completed. During the first stages of a contract, 15% of the semi-monthly estimates are withheld. If progress is good, however, the contractor is paid more than 85% of his semi-monthly estimates during the later stages of the work, but sufficient earned money is always withheld as a contingent to insure completion of the work, in addition to 115% of the uncompleted items.

• **Standardized bridges**—Standardization of plans has contributed more to speeding Ohio's bridge construction program than any other single factor. It has also reduced the cost of plan preparation as well as the cost of construction itself.

Standard bridge plans now include continuous reinforced concrete slabs up to 40 ft, and three-span continuous rolled beams up to an 85-ft center span with 68-ft end spans.

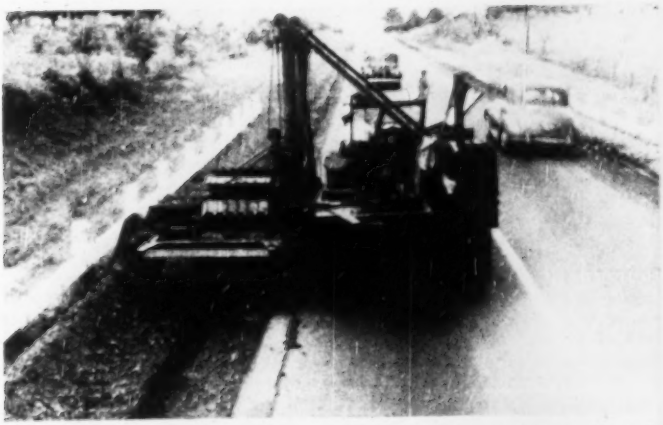
Another point of economy—including a definite contribution to highway safety—is being incorporated in bridges of relatively short over-all lengths. It is the adoption of a full-width bridge roadway equal to the shoulder-to-shoulder width of approach embankments.

Handrails on these bridges are both simple and economical, yet strong enough to resist a uniform horizontal force of 500 lb per lin ft. They are a single beam-type non-flexible rail carried on H-beam posts mounted on the outside of the concrete deck. These bridges carry no concrete curbs, no roadway drains are needed as all drainage is transverse, and the approach guardrail is simply a continuation of the bridge guardrail.

This policy of full-width bridge decks and beam-type guardrail is generally used on bridges of less than 50 ft abutment-to-abutment. In special cases, where warranted by large volumes of high-speed traffic, these design features have been used on bridges up to 150 ft, also for one bridge now on the drafting boards having a total length of 156 ft.

• **Many inadequate bridges**—Ohio is notable for the large number of bridges built since the war—but it is equally noted for the inadequacy of its older bridges—a curse that only a greatly expanded bridge-replacement program can hope to cure.

At least one out of every four of the 9,500 bridges (over 10-ft length) on the state highway system is in-



SPECIAL TRENCHER starts widening operations on a narrow road section. Then . . .

FIRST COURSE base material is placed, keyed and rolled, and . . .

TOP COURSE is added, and a bituminous surfacing is placed. Eight miles of widening are done for the price of one mile of new paved highway.

TRENDS IN UNIT CONTRACT PRICES

Item	Unit	1948	1949	1949 vs. 1948 (% Change)
Roadway Excavation	cu yd	$0.75	$0.52	—30.3
Waterbound Macadam	cu yd	7.51	7.44	— 0.9
Penetration Macadam	cu yd	13.55	11.34	—16.3
Bituminous Surfacing (Hot Mix)	cu yd	13.64	12.21	—10.5
Reinforced Concrete Pavement	cu yd	17.96	17.10	— 4.8
Bridge Concrete (Substructure)	cu yd	54.48	48.90	—10.2
Bridge Concrete (Superstructure)	cu yd	58.83	50.83	—13.6
Reinforcing Steel	lb	0.112	0.092	—17.5
Structural Steel	lb	0.146	0.118	—19.5

adequate for present-day traffic. They are either too weak or too narrow, or both. As shown in the accompanying chart 3,500 have roadway widths less than 20 ft, 2,030 have roadways less than 16 ft, 2,740 are good for less than an H-12 live load, and 1,350 cannot safely carry an H-7 load. Several of these bridges are over 200 ft long.

If all highway funds currently available yearly for new construction were spent each year on bridge replacements on the state highway system—allowing none for construction and reconstruction of roads, it would take at least 10 years to bring the state's bridges up to an acceptable standard. This does not include the 15,300 county and township bridges, many of which are in a more advanced condition of disrepair. Bridge failures are increasing each year. Of the 116 failures last year, 36 required complete replacement.

Posting bridges in Ohio for reduced loads is a never-ending job. Those capable of carrying an H-12 loading—based on allowable unit working stress 50% in excess of design unit stress—are posted; those good for only an H-7 load are rated as dangerously weak. The department has investigated and posted 465 of its bridges for reduced load limits; and 2,000 others need posting.

When the 1949 Ohio State Legislature increased the allowable legal loads (permissible single axle load was increased from 18,000 lb to 19,000 lb) it did two things: added more bridges to the inadequate list, and exceeded the loadings currently used in designing new bridges. Both of these loadings exceed the legal loads recommended by the AASHO, as well as its H15-S12 loads.

• **Stronger truck weight law**—some relief from overloading was afforded Ohio's bridges and highways last year when the state legislature put real teeth in its law governing the overloading of trucks. Starting off with a $25 fine for overloads up to 2,000 lb, it goes up to $75 for 5,000 lb overload; $125 for 10,000 overload. Above 10,000 lb overload the fine is $25 plus 2¢ per lb. The truck driver can also draw a jail sentence up to 30 days for an overload exceeding 5,000 lb.

The incoming administration on Jan. 1, 1949 found practically no backlog of bridge plans; the previous administration had awarded contracts on nearly all bridges for which plans had been prepared.

Starting almost from scratch the first of last year, the Bureau of Bridges under Richard Orth, chief engineer and D. H. Overman, assistant chief engineer, together with a total office force of 63, prepared plans and specifications for 91 bridges during 1949, and partial plans for 41 more. Contracts were awarded for 68 bridges last year at a total cost of $3,500,000.

Some aid is received from consulting engineers in making studies and designs for the more intricate bridges. Ordinarily they are engaged by cities on "master plan" studies or urban freeway projects, with reimbursement by the highway department.

Employment of consulting engineering firms for bridge design, however, is viewed by the department only as an expedient to get over the "hump" in its bridge program. The department's philosophy is to build up its bridge engineering personnel to handle all its field and design work.

With a backlog of 50 completed bridge plans on hand, this year's bridge construction program promises to be one of substancial magnitude. In fact, the department plans to award $10,000,000 worth of bridge construction this year on its primary, secondary and urban highways.

How further reductions in construction costs have been made possible through research and laboratory control, together with innovations in maintenance and in traffic and safety, will be described in a subsequent issue.

Contractors Set Safety Record on USBR Projects

Contractors' who piled up a total of 26,552,241 man-hours of exposure during 1949, set a new record for safety on U. S. Bureau of Reclamation projects according to a recent USBR year-end report.

Lectures to foremen and supervisors and constant attention to safety details are credited with the improvement in the reported accident rate.

The contractor forces showed a reduction in frequency rates for the second consecutive year, establishing a record 33.9 rate—lowest since the inception of the bureau's safety program in 1937. By comparison, the 1948 rate was 46.2.

In the same period, there were only 17 fatalities, compared to 22 for 1948. One of these was caused by the explosion of a dynamite primer; dump trucks caused three deaths; equipment contacting overhead power lines killed two, three were killed by falling objects, and others were killed in falls from scaffolding, forms and other places.

Lost time injuries went down to 900, from 1017 in 1948.

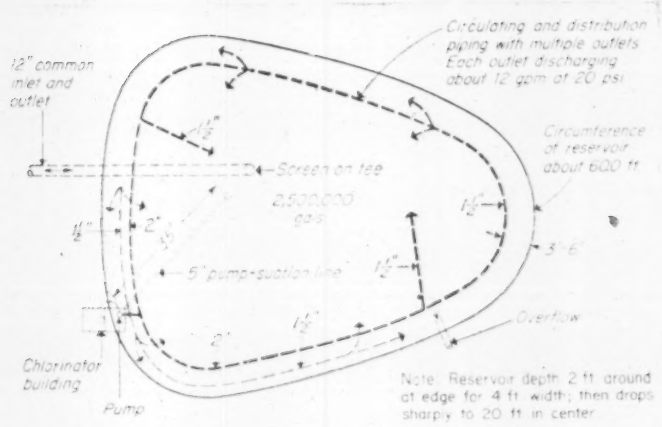
The accompanying table summarizes the accident experience in terms of the different types of operations performed.

ACCIDENT EXPERIENCES ON USBR PROJECTS

	Man-Hours of Exposure	Lost-Time Injuries	Days Lost	Frequency* Rate	Severity** Rate
Canals	6,847,814	178	16,000	26.0	2.34
Concrete dams	4,481,130	179	45,646	39.9	10.19
Earth dams	8,372,293	231	41,758	27.6	4.99
Tunnels	580,053	33	306	56.9	0.53
Miscellaneous	6,270,951	279	16,071	44.5	2.56
Totals and Averages	26,552,241	900	119,781	33.9	4.51

* Lost-time accidents per million man-hours.

** Days lost per thousand man-hours.


12" common inlet and outlet
Circulating and distribution piping with multiple outlets Each outlet discharging about 12 gpm at 20 psi
Circumference of reservoir about 600 ft
Screen on tee
2,500,000 gals
5" pump-suction line
3'-6"
Overflow
Chlorinator building
Pump
Note: Reservoir depth 2 ft around at edge for 4 ft. width; then drops sharply to 20 ft. in center

CONTINUOUS RECIRCULATION and chlorination oxidizes algae growths and keeps the water in the open reservoir crystal clear.

Controlled Continuous Chlorination Keeps . . .

An Open Reservoir Free of Algae

"IF YOU'RE A WATERWORKS MAN and lie awake nights worrying about sickly green algae growths in a small uncovered reservoir, you can lick your problem. It can be done with an inexpensive recirculating and chlorinating system." So says Claude Van Deusen, superintendent of water and sewage at Chatham, N. Y.

This simple system for controlling algae—which also provides protection against secondary pollution—was put in a 2.5-mg open distributing reservoir for less than $5,000. And, Van Deusen points out, it costs only about $1.35 a day to operate. The daily cost is divided: $0.85 for chlorine and $0.50 for power.

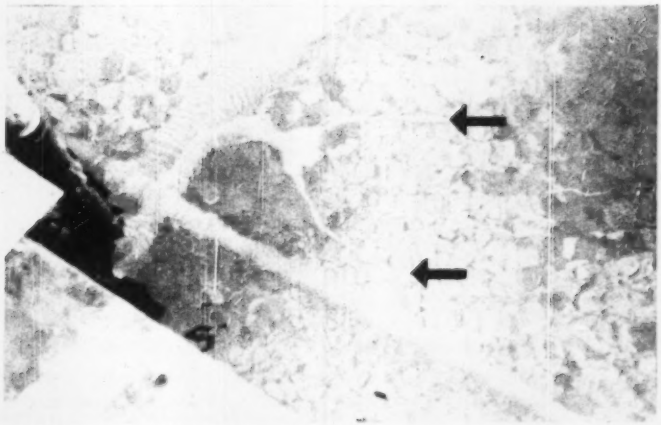
• **The system**—The chlorinating and recirculating system—similar to that utilized for purifying swimming-pool water—consists of a pump, a chlorinator and submerged pipe lines and outlets (diagram). The objective of this set-up is to feed chlorine continuously to recirculated water and to maintain currents throughout the reservoir so that there are no "dead" spots.

The reservoir averages about 20 ft deep in the central spoon-shaped portion, is surrounded by a 2-ft concrete curb and is founded on impervious hardpan.

Water is drawn from the deepest part of the reservoir through a 5-in suction line by a 150-gpm close-coupled vertical-turbine pump with a 5-hp electric drive (photo). As it leaves the pump, sufficient chlorine is injected to the discharge to maintain a maximum free residual of about 0.35 ppm in all parts of the reservoir. This free residual drops off to a minimum of .05 ppm during the day due to the action of sunlight.

The chlorinated discharge is conveyed to various sectors of the reservoir by 1.5- and 2-in copper pipes. It is directed by 0.5- and 0.375-in. nozzles to give maximum circulation. The lines are laid near and parallel to the reservoir's edge on a ledge that is 2 ft deep at the curb and 4 ft deep 6 ft out. The outer outlets are directed to keep the water circulating around the reservoir, the inner ones are pointed downward to maintain vertical current in deep portions.

The all-weather 20-psi pump is suspended into the reservoir from a concrete slab which also is the base for the chlorinator house. Made of cinder block, the chlorinator house is



Y-SHAPED OUTLETS (1-in. copper tubes with ⅜- or ½-in. nozzles) in the reservoir direct chlorinated discharge to get maximum circulation.

AN ALL-WEATHER vertical unit pumps chlorinated discharge into the reservoir.

heated by an electric heater-fan actuated by thermostat. It has space for storing at least six cylinders of chlorine. A small I-beam extends outward from the housing over the pump. This facilitates removal of the pump for cleaning and repair.

Water under pressure for operating the chlorinator is taken from the pump discharge by a 0.75-in. copper tube.

• **Starting up**—When the system was put into operation, chlorine dosage ran as high as 50 ppm to maintain a residual of at least 1 ppm in the reservoir. As organic matter was oxidized and chlorine demand decreased, dosage was reduced to about 5 ppm to give a 0.35 ppm residual. This treatment requires 10 to 12 lb of chlorine per day. It is reported to limit algae to less than 10 units per cc of water when operated continuously.

The system is utilized from April to November when algae growths are most severe.

• **About the problem**—The algae trouble developed several years ago, Van Deusen reports. At that time tests made by the N. Y. State Health Department laboratory indicated that the water contained large quantities of Scenedesmus algae. During summer months it is found in quantities ranging from about 900 to 1,500 units per cc of water, but on one occasion 8,700 units were recorded.

Since Chatham obtains its supply from three drilled wells about 60 ft deep, it appears that exposure of the water in the reservoir to sunlight causes the rapid development of discoloring algae. Water is pumped directly into the distribution system and consumers near the source were not annoyed by sickly discoloration, Van Deusen states. Those adjacent to the reservoir, which floats on the distribution system, complained bitterly about the taste and odor condition of the water.

The severity of the complaints caused no end of managerial worry, he recalls. Frantic efforts were made to clean up the reservoir. Batch treatment using both copper sulphate and chlorine (HTH) as well as thorough cleaning of the reservoir was tried for two seasons and failed completely to remedy the problem.

In desperation, the village officials decided to build a small covered storage basin. Vote approval was sought and obtained for a $40,000 bond issue and plans were prepared for roofing reservoir.

About this time L. J. Peck of Peck Pump & Equipment Co., Inc., Albany, N. Y., suggested that continuous chlorination and recirculation would solve the problem at much less cost. This suggestion, from a salesman—although competent and reliable—Van Deusen says was received with considerable skepticism. But Peck's offer to prove his point was accepted.

A portable pump and chlorinator were set up and connected to a temporary piping system. This was done at the time of the most severe growths. And the results were convincing. Within 15 days, secondsmus dropped to 40 units per cc and a month later to 4 units.

The demonstration convinced the Village Board and they voted to install the recirculating and chlorinating system—at a saving of probably more than $35,000.

Another advantage, Van Deusen points out, is that the proposed reservoir would have held only a day's supply. The recirculated reservoir holds a 6- or 7-day supply depending on consumption.

• **PS**—The chlorination and recirculation system was installed by Peck's organization. And Van Deusen's water-quality worries are at an end. The chlorinator was by Wallace and Tiernan Co., Inc., Newark, N. J., and the pump by Peerless Pump Division, Los Angeles, Calif.

Notes on Legal Decisions

Summaries of decisions relating to construction prepared by I. Vernon Werbin, counselor at law and engineer, New York, author of Legal Phrases of Construction Contracts (McGraw-Hill)

No Pay for the Architect

An architect entered into an oral contract to draw plans for the construction of a hotel, the cost of which was not to exceed $250,000. After he had prepared the plans, contractors' estimates showed that the cost would be more than twice the stipulated upper limit, and the hotel was not built. When the architect brought action to collect from his client, the court held that he was not entitled to any compensation for preparing the plans. The court said, "Where an agreement provides for a building not to cost more than a certain sum and the cost does exceed that sum, the architect is not entitled to compensation."

Under the above circumstances the architect is not entitled to recover for services rendered on the basis of the fair and reasonable value of the services rendered.[1]

[1] Howell v. Cryer, 204 P. 2d 142 (District Court of Appeal, California, Sept. 2, 1949.)

Rights of Subcontractors

A subcontractor has no right of action against the owner for alleged negligent failure to require the general contractor to furnish a bond to insure payments due the subcontractor. Where however, the subcontractor undertakes to perform work for the general contractor in reliance on the representation of the owner that the general contractor had furnished a bond for the payment by the general contractor of all its obligations to the owner and to subcontractors, and no such bond was in fact furnished, the subcontractor has a right of action against the owner for damages sustained by reason of such misrepresentation.[1]

[1] Cf. Champion Construction & Engineering Co. v. Bank of North Temescal Building Assn., 92 S.W. 2d 242.

Defective Workmanship

"A mere acceptance, without more, does not preclude the owner from showing that the work was done in an unworkmanlike manner, especially when the defects were latent or when the owner had no reasonable means of ascertaining such defects and, when ascertained gave timely notice thereof, even though he had paid the contract price."

"It has been held that a contractor is bound to discover defects that are reasonably discernable or patent, and where he knows, or has reason to believe, that the plans are defective and follows such plans without pointing out the defects to the owner or architect, he is not entitled to recover if the building proves insufficient because of such defects."[1]

[1] Cf. Bandini Co. v. Frank T. Hockey, Inc., 200 p. 2d 166 (District Court of Appeal, Calif., 4th, Sept. 19, 1949) and numerous cases there cited.

Bond to Secure Payment For Labor and Materials

Where a general contractor gives a bond to secure payment for labor and materials furnished by subcontractors, subcontractor cannot recover on such bond damages resulting from being prevented from fully performing the subcontract.[1]

[1] Cf. Lange v. Woodcock, Hegeler & Zinser, 176 P. 2d 776 (Supreme Court of Arizona, 1946) and cases cited.

THIS LOW-COST, 120-FT SPAN, BRIDGE was one of several built in Walla Walla County to replace structures damaged or destroyed by flood. Spanning the Touchet River, it consists of four steel beams and a timber deck.

Bridge Built for $11.25 Per Square Foot

HEAVY FLOODS last year severely damaged several bridges in Walla Walla County, Wash. Many of the bridges had to be completely rebuilt. So County Engineer B. Loyal Smith faced the problem of rebuilding the bridges (all on secondary roads) in a minimum of time and at an economical cost. Smith wanted a design that could be built quickly and cheaply and still provide at least a semi-permanent structure.

The design adopted uses wide-flange steel stringers supporting a laminated timber deck. Abutment piers consist of reinforced concrete columns poured in corrugated metal pipe casings and topped with a concrete beam. A timber retaining wall with wings is placed behind the abutment piers. When intermediate piers are used, they are of conventional concrete bent construction.

The first of these new bridges (two 60-ft spans) cost $134 per lineal foot of 22-ft wide deck or $11.25 per sq ft. This is less than half the average cost of the last four reinforced-concrete, two-lane bridges built by Walla Walla County.

This bridge (known as the Lockenbill Bridge) spans the Touchet River with a 12-ft minimum vertical clearance. Designed for H-20 loading, it has four 30-in. wide-flange beams in two simple spans.

Footings for the two abutments and the center pier are keyed into solid rock about 3 ft below stream bed. Use of corrugated metal pipe as column forms at the abutments hurried the work along.

The abutment retaining walls are made of 4-in. thick, mixed, pressure-treated planking extending from the footing to the underside of the reinforced concrete cap. Estimated life of the planking is 35 years. An interlocking design makes the planking easy to install and to replace.

A 6-in. thick laminated timber deck provides the road surface. The 3x8-in. Douglas fir pieces are placed on edge and fastened together by bridge spikes driven on 15-in. centers.

The deck is fastened to the top beam flange with bolts spaced on 15-in. centers and staggered so as not to fall all in one deck timber. The flat-headed bolts are double nutted on the underside of the flange.

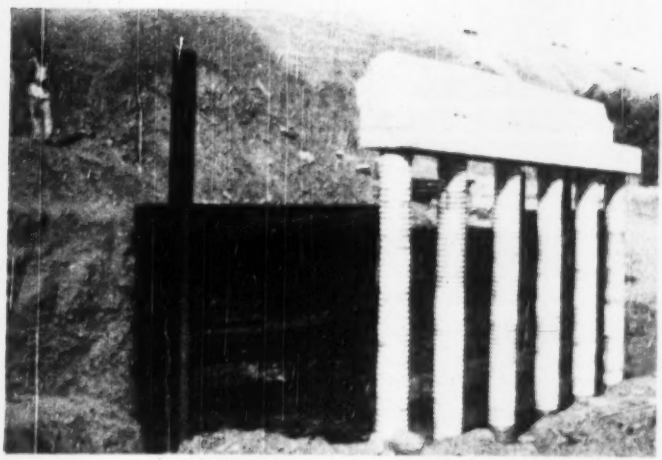
Transverse camber in the bridge deck is provided by installing the two center steel beams 2 in. higher than the two outside beams. Longitudinal camber is provided by constructing the center pier 0.10 ft higher than the end abutments. Expansion provisions are made at the center pier.

The pressure-treated timber backwalls and wings as well as the timber deck were installed as an economy measure. If desirable later, it will be easy to add a reinforced concrete curb, wall, and a reinforced concrete deck slab could also be placed on top of the timber deck.

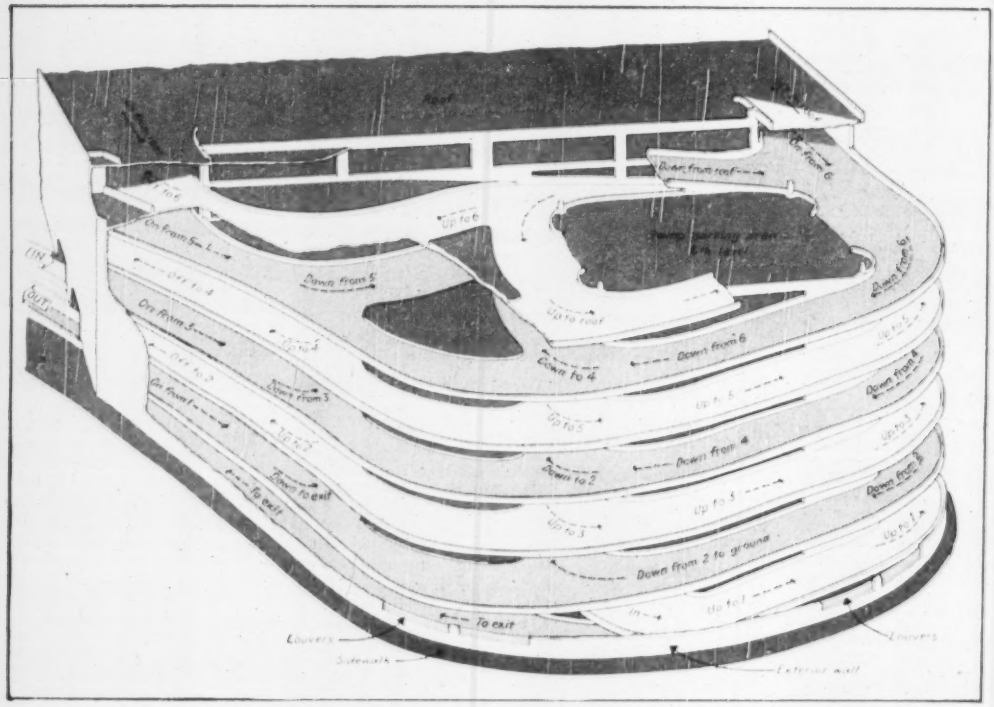
Since ice is a problem, the center pier has a pointed upstream edge, tipped with steel to serve as an ice breaker.

Wheel guards and timber handrails are bolted in place.

Construction is done by day labor under supervision of county engineering employees.



REINFORCED CONCRETE COLUMNS at the abutments were poured in corrugated metal pipe. This sped the work and eliminated costly forming.



One-way ramps spiral like a double-threaded screw between parking floors of...

Garage to Relieve New York Traffic Jam

John J. Dwyer
Civil Engineer
Triborough Bridge & Tunnel Authority
New York, N. Y.

LIKE MOST CITIES, New York is suffering from traffic congestion. Like many of these cities, it sees some relief in off-street parking facilities. So it is building a truck terminal to take the big trucks off the streets, a bus terminal to get rid of long-distance buses, and most recently, a $5,000,000 garage for passenger cars.

First of a series of public garages the city plans to build, this multi-story building is noteworthy because the design is based on principles developed from studies of parking facilities all over the U.S. and because it certain construction features. Among other things, the ramps leading to parking floors are in a separate structure.

Known as the Battery Parking Garage, it is the only reinforced concrete building in the New York metropolitan area built entirely of air entrained concrete. This is especially significant in view of the long spans employed in it. Bays are 52x58 ft.

• **Erection loads test floors**—The concrete was proved to have adequate strength, when, during construction, the floors were loaded with about 2.4 times live load without damage. This loading came about through adoption of a construction method that saved both time and money.

Structural analysis indicated that if the weight of a newly poured floor was transferred through shores to the floor below, the lower floor would be overloaded. The possibility of shoring to the ground or of distributing the load over several floors was then considered. This would have required careful wedging and reshoring to allow for the deflections of the long-span floor beams, hence the scheme was abandoned.

An economical solution was finally found. Beams and girders in the lower floor were reinforced with additional steel at critical points, allowing it to carry safely the construction loads of the floor above without the assistance of other floors.

• **Postwar jam foreseen**—Credit for the Battery Parking Garage is due Robert Moses, chairman of the Triborough Bridge and Tunnel Authority. Anticipating the postwar traffic jam in New York City, Mr. Moses in 1945 arranged through state aid to finance studies and the preparation of working plans for this structure—the first of a series of public parking garages.

• **Design considerations**—In planning it, designers considered many factors determined from traffic studies, including the demand for and supply of parking space in the area, suitable site location, garage capacity, the parking pattern, and layout of ramps and floors. They also set up the following objectives:

1. To make the garage flexible in layout to permit changes in the park-

ing pattern and provide for future trends in car sizes.

2. To design it for customer or attendant parking, or a combination of both, to meet changing times and economic conditions.

3. To provide a conservative architectural treatment that reflects the type of structure.

The garage occupies a 50,000-sq ft site bordering the Manhattan terminal of the Brooklyn-Battery Tunnel. Irregular in shape, 317 ft long, it consists in reality of two structures—one for parking and the other for ramps—separated by an expansion joint. It can accommodate 1,050 customer-parked cars or 1,500 attendant-parked cars.

• **The parking structure**—234 ft long and 172 ft wide—contains seven parking levels, including one on the roof. All are above ground; the only basement is a small space for mechanical and electrical equipment under the lobby. Stores, offices, elevator shafts, fuel pumps, grease racks and storage space occupy about one-third the ground floor. A car-washing room is on the third parking level.

On each parking floor, cars are parked back to back along the column lines. Within a 52x58-ft bay, there are eight 8x18½-ft stalls, four on each side of a 21-ft aisle. Floor to floor height is 11 ft, but the clear height under the girders is 8 ft.

Floors are laid out for one-way travel. To accomplish this, a one-way line connecting with the entrance and exit ramps is provided along the outside walls.

For vertical transportation for customers and employees, two self-service elevators are being installed in the center of the structure. Another elevator may be added in the future, if conditions warrant. Employees may descend quickly via a sliding pole in the ramp area. For emergency use, there is a fire tower in one corner and a stairway in another corner and in the ramp section.

• **Long-span concrete beams**—The parking structure is of rigid-frame design, with reinforced concrete walls furnished on the outside to give the appearance of clapboard. The designers called for 3,000-psi concrete for typical floor beams, girders and slabs and for 3,500-psi concrete for the roof slab, columns and spandrel walls. Entrained air, obtained with air-entraining cement, was required to be between 4½ and 6%.

Floors were designed for 75-psi live load. They are 4 in. thick, reinforced with welded-wire fabric. They have a wood-float finish and are treated with dustproofing and hardening material composed of gums and oils.

The roof is waterproofed with 3-ply fabric and protected with a 3-in. concrete wearing surface. Reinforced with wire mesh, this slab is divided into 5x5-ft squares by ½-in. asphalt-filled joints, to permit expansion and contraction.

Floors and roofs are supported on 3-ft deep beams and girders. The beams are spaced 10 ft 5 in. on centers and span 58 ft, braced by concrete diaphragms at the third points. Beam and girder reinforcement consists of 11-in. square bars ranging in length up to 67 ft.

• **Forms used seven times**. One set of forms was employed for an entire floor and re-used for each of the six other levels. Only slight modifications had to be made for the first floor and roof. Made of ¾-in. plywood, the forms were given a light coat of oil before each use.

Circular, composite, spiral-reinforced columns with H-section steel cores support the interior of the building. Exterior columns are of the double-steel-core composite type or of the tied-column type.

Column forms were stripped the day following a pour. Forms under slabs and on the sides of beams and girders were removed after four days. But stripping of the remaining forms was not permitted until the concrete had reached a minimum strength of 2,000 psi (usually after 7 days), and the members were not allowed to take the superimposed load of the floor above until the concrete had reached its full design strength (usually at an age of 21 days).

Control joints were provided in the exterior walls at a maximum spacing of 25 ft. Their purpose is to prevent or localize cracking.

• **The ramp structure**—at one end of the parking structure—has the shape of the ramps within it and coincides with the contour of the exit plaza of the Brooklyn-Battery Tunnel. Glass-block panels and metal louvers in the concrete walls furnish light and ventilation for the ramps.

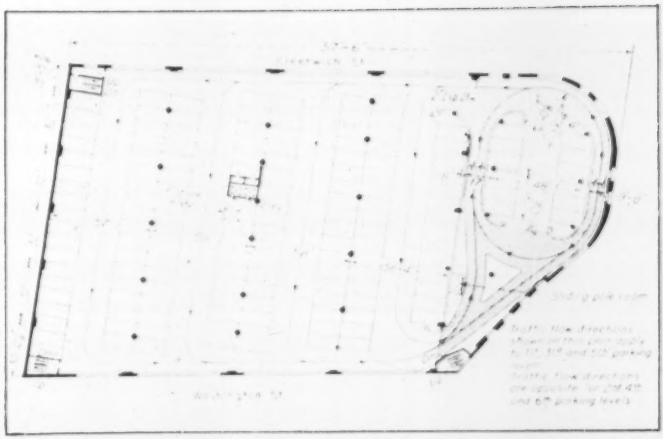
Automobiles will enter the building from either of two streets and ascend a one-way ramp to an assigned parking level; they will descend another one-way ramp and leave into either street. For peak traffic, both ramps may be operated in the same direction.

The ramps spiral around an elliptical core much like the threads of a double-threaded screw. Cars rise or drop one level in a half turn of a ramp; make only 3¼ revolutions in getting to the roof. Minimum grade is 5.15%; least width inside curbs 9 ft 8 in. and minimum curvature 33 ft 4 in. along the center line.

Space inside the core is also available for parking.

Two sets of forms were used for typical stories in the ramp structure to speed up construction. These forms were modified slightly for the roof.

The Battery Parking Garage is being built by the Triborough Bridge and Tunnel Authority and will be operated by the Socony-Vacuum Oil Co. George Spargo is general manager and Ralph Smith is chief engineer of the Authority. The author made the preliminary studies, developed the layout and supervised the structural design. Thompson-Starrett Co. is the general contractor. Brennan & Sloan are the concrete subcontractors.



TYPICAL LEVEL of the parking structure and the separate ramp structure. Typical parking bays contain eight 8x18½-ft stalls, four on each side of a 21-ft aisle.

BOOK REVIEWS

Water Power

HYDROELECTRIC HANDBOOK—Second Edition. By William P. Creager and the late Joel D. Justin. 1,151 pp. John Wiley & Sons, New York 16, and London. $12.50.

Both the authors and publishers are to be highly commended for the way this handbook has been revised. Second editions, all too frequently, contain relatively few changes from the original even though major changes may have taken place in the subject of the book. This text is essentially new, and the authors spared no trouble in seeing that each part is up to date. Two hundred pages have been added and the number of contributors has been doubled.

In scope the book covers the whole field of water power development from preliminary studies of rainfall and run-off through the design of dams, power stations, and power lines to the problems involved in operating the completed plants. The authors, however, make a point of observing that a complete exposition of designing methods cannot be contained in a single book. They have endeavored with notable success to give the reader a grasp of the many problems involved in a hydroelectric power development and to provide sufficient data for preliminary designs and rough cost estimates.

Riggers' Manual

HANDBOOK OF RIGGING—By W. E. Rossnagel. 313 pp. McGraw-Hill Book Company, New York 18, and London. $4.75.

Mr. Rossnagel, safety engineer for New York's Consolidated Edison Co., tells a story that will satisfy both the rigging foreman and the professor who is trying to work up a construction-course sequence. The book starts with a chapter on the mechanical principles applicable to handling heavy objects; then it takes up the basic components of rigging—ropes, chains, timber—discussing their physical properties, standard defects, and commercial classifications. The remainder of the book takes up rigging devices, chapter by chapter (e.g., scaffolding, boatswain's chairs, hoists) and discusses safety procedures.

A large number of tables, in both the text and appendix, enable a reader quickly to calculate safe loads for various devices. These tables cover strength and condition of basic components as well as the strength of standard connections such as hooks.

Illustrations include good photographs and drawings as well as working diagrams of a few devices and connections recommended by the author. And in one section more than 100 common and uncommon rope knots are illustrated.

Material-Handling Aid

CONVEYORS AND ELEVATING EQUIPMENT—Second Edition. By Wilbur C. Hudson. 468 pp. John Wiley & Sons, New York 16; Chapman & Hall, London. $7.00.

Material handling is a denominator that is common to many industries, not excepting construction. This book is about modern, efficient material-handling devices, many of which are used by progressive contractors. All contractors may profit from the book's content because not only does it suggest ways of handling materials, but also it provides installation and engineering data that will enable the contractor to rough out mechanical material-handling schemes for jobs he is bidding. In many cases, moreover, comparative cost data are given.

Machines discussed are those that most frequently enter into average problems. They include screw, flight, bucket, fluid-and-belt conveyors as well as transverse. Machine elements, such as chains and motors, are discussed, as are dust explosion hazards, weighing-bin characteristics and material characteristics.

While material-handling devices work on principles established 50 and more years ago, the author states, great improvements have been made through development of V-belt drives, alloy steels, vibrating screens and feeders, sealed anti-friction bearings and other innovations.

Bridge Design Text Revised

THE RIGID FRAME BRIDGE—Third Edition. By Arthur G. Hayden and Maurice Barron. 240 pp. John Wiley & Sons, New York 16, N. Y., and Chapman & Hall, London. $5.

In this new edition of a well-known book on the design of rigid-frame bridges, 120 pages of obsolete material have been replaced with current information, more recent illustrations have been added, a shorter method for obtaining influence lines is presented and a chapter on the theory and design of skewed bridges has been inserted.

The design method given in the new chapter is based on the assumption that moments and thrusts in the plane normal to the abutments is the same for all arches or rigid frames having the same square span, regardless of the skew. Square-span stresses for temperature change are multiplied by the square of the secant of the skew angle. No proof of these assumptions is presented in the book.

Miscellaneous Notes on Booklets and Reprints

INGENIERIA CIVIL—A new publication devoted to civil engineering and written in Spanish made its appearance in January. Printed in Havana, it is the official organ of the College of Civil Engineers of Cuba. Address: Mangana de Gomez No. 245, La Habana, Cuba. $5.00 a year.

INFLUENCE VALUES for steel roof trusses are given in a 40-page pamphlet "Tableaux pour le Calcul Rapide des Fermes Metalliques," by Victor Battaille. Published in French, it may be purchased for 90 francs from Centre Belgo-Luxembourgeois d'Information de l'Acier, 134 Avenue Louise, Bruxelles, Belgium.

PROPER SIZING OF EXCAVATORS AND HAULING EQUIPMENT—Contractors who have or machine excavation jobs—particularly if shovel jobs will get valuable assistance from this booklet. By tables and discussion it tells the performances that can be expected from different-sized machines under various conditions. Then it advises on the size and number of trucks to be used for maximum output with given excavators, considering haulage conditions. Technical Bulletin No. 3, 24 pages, Power Crane and Shovel Association, 74 Trinity Place, New York 6, N. Y., $.50.

New Engineering Books

DICTIONARY OF BUSINESS TERMS—SPANISH-ENGLISH AND ENGLISH-SPANISH—By Louis A. Robb. 219 pp. John Wiley & Sons, New York; Chapman & Hall, London. $4.00.

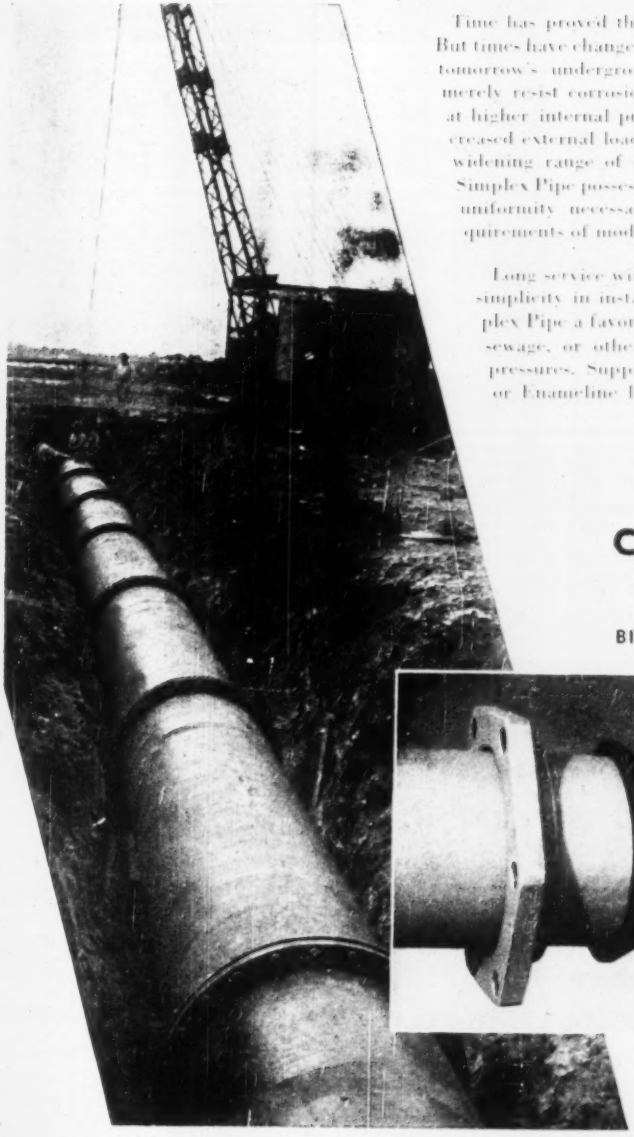
HYDROELECTRIC HANDBOOK—Second Edition. Edited by William P. Creager and Joel D. Justin. 1151 pp. John Wiley & Sons, New York; Chapman & Hall, London. $12.50.

THEORETICAL HYDRODYNAMICS—Second Edition. By L. M. Milne-Thomson. 660 pp. The Macmillan Co., New York 11. $8.50.

HEAT PUMP APPLICATIONS—By Ernest N. Kander and Albert Ogilsby, Jr. 300 pp. McGraw-Hill Book Co., New York 18, Toronto, London. $6.00.

(Continued on p. 82)

MODERN PIPE *for* *Modern Service Requirements*



Time has proved the enduring qualities of Cast Iron Pipe. But times have changed, are still swiftly changing. Today's and tomorrow's underground mains must do much more than merely resist corrosion. They must convey greater volumes, at higher internal pressures; they must withstand vastly increased external loadings; they must be adapted to an ever-widening range of service conditions. Mono-Cast Doublex Simplex Pipe possesses the exceptional physical strength and uniformity necessary to meet the increasingly severe requirements of modern usage.

Long service with minimum maintenance, coupled with simplicity in installation, make Mono-Cast Doublex Simplex Pipe a favorite for systems conveying gas, oil, water, sewage, or other liquids under high, medium or low pressures. Supplied with or without tar coating, cement or Enameline lining in sizes 3" through 48".

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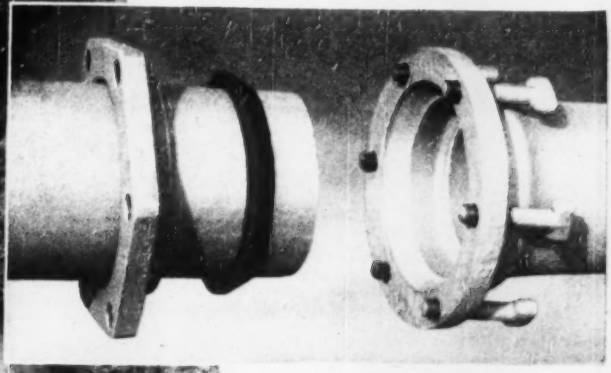
AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM 2, ALABAMA



The Doublex Simplex joint allows for lateral deflection and longitudinal expansion and contraction in the line without danger of leakage.

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M & H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

READER COMMENT

Others Helped, Too

Sir: As the method of presentation for the article "The Rat" (April 6, p 39) did not give an opportunity for acknowledgements, I would like to express appreciation to those who reviewed, criticized or supplied basic material for the story. Among these men are: Of the U.S. Public Health Service—Clyde L. Fehn, engineer; G. L. Carley, Jr., Sheldon Lang, sanitary engineers, and J. S. Wiley, senior sanitary engineer; J. E. Borches, training specialist and C. O. Mohr, scientist. Also Dr. D. E. Davis, mammalogist, The Johns Hopkins University; V. I. Dempster, sanitary engineer, Department of Health, Detroit; L. R. Gates, sanitary engineer, Department of Health, Kansas City, Mo.; and F. C. Jones, assistant district agent, U.S. Fish & Wildlife Service.

Photographic and illustrations might have well carried the full credit: Communicable Disease Center, U.S. Public Health Service.

John M. Henderson
Professor of Sanitary Science
Columbia University
New York City

Research Tower Design Liked

Sir: Your article, "Tree-Like Laboratory for Wax Research," (ENR April 6, p. 35) deserves to be reprinted and distributed among engineers, architects and contractors as a stimulus of modern design. This building demonstrates that American ingenuity and originality in progressive methods of design can create structures of high esthetic value, beauty, economy and permanence—all characteristics which we like to admire abroad, e.g. structures designed and built by the Swiss Maillart's, the French Freyssinet; Spain's Torroja; Germany's Dischinger, and many others.

The administration building of S. C. Johnson & Son, Inc., has been for decades a symbol of modern architecture all over the world. The Research Tower Building will have a similar significance as a further step of development. It is a new and proper expression of reinforced concrete as a new structural material, in fine application of its characteristic and advantageous properties.

The principles of this design are basically different from the "old fashioned" typical "slab-beam-column" principles, which are right for other materials commonly used—wood and steel. More than 12,000,000 sq ft of shell-type structures in reinforced concrete (barrel shells, domes) have already been built in the United States, and their application increases rapidly.

Recent developments of experimental stress analysis will overcome the difficulties and intricacies of proper and true design, since for these types of structures, typical methods of calculation no longer prove to be correct. Another revolutionary design of Frank Lloyd Wright, the Guggenheim Museum of Art in New York to be started this year, required three models and about 5,000 accurate measurements to determine the real stresses in the future structure. The usual theoretical analysis becomes only an instrument of verification and corroboration, as it was with the original tip-toot foundation of the Research Tower Building.

J. J. Polivka,
Consulting Engineer,
Berkeley, Calif.

Safety Factor Meaningless

Sir: Your editorial in ENR April 13, p. 21, "Safety Factor for Prestressing," brings to the attention of those interested in prestressed concrete a timely and interesting topic for discussion.

For lack of sufficient experience in this type of construction, no organization or individual in this country is in a position to give a satisfactory answer to the various questions raised in your editorial. Insofar as our work is concerned, experience is confined to a program of prestressed concrete tanks built during the war. In that task, we followed a rather conservative practice, where not only no allowance was made for any tension in concrete, but also a provision was included to retain a minimum compressive stress of 50 psi under the maximum condition of loading. In the case of steel stresses, when using ordinary bar reinforcing, the applied prestress equaled about 0.6 of the yield value of the steel.

Now, it so happens that in tank design additional steel stresses due to operational loading and temperature are just about compensated by the reduced strains resulting from shrinkage and plastic flow. While the fluctuations of the two opposite strains do not occur simultaneously, for all practical purposes, it may be so considered. Accordingly, the final, or eventual, stresses in steel will remain in the range of initially introduced prestress. In this instance, the adopted

(Continued on page 51)

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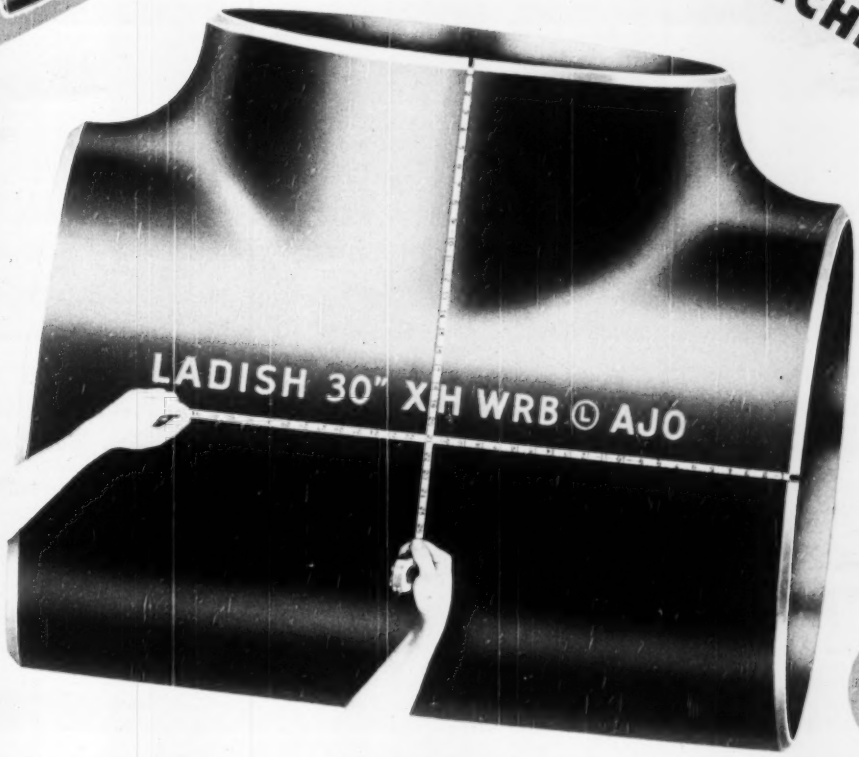

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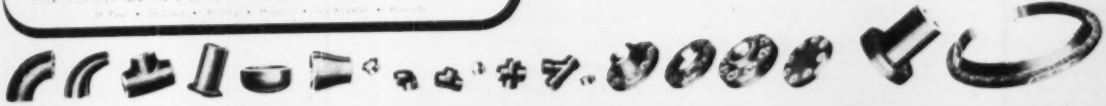

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(Continued from page 48)

factor of 0.6 of the yield value corresponds to that generally used as working stress in structural work; that is, 20,000 psi, which is approximately 0.6 of 33,000 psi.

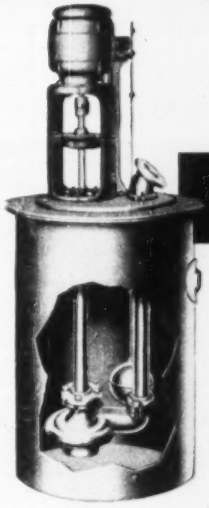
In some later constructions of tanks, where use was made of thin-shell concrete and cold-drawn high-tensile wire reinforcing, the prestress in steel was raised to a value of about 0.8 the yield. To date, no difficulties have been experienced with these structures. Their satisfactory service performance indicates that we could use higher initial working stresses at least in this category of structures. Whether the same thing can also be done in other types of work is something yet to be studied.

You are right in your observation that the so-called factor of safety is meaningless in prestressed design. In conventional analysis, this factor indicates a margin of strength between the computed strength and the ultimate resistance of a framing—in other words, a practical working margin to avert failure or collapse. On the other hand, in prestressed work, such a factor will indicate the margin for retention of prestress in concrete. This margin may be exceeded by an overstress in steel. If the increased stress is still less than the yield value of the reinforcing, the resistance of the affected sections will not be appreciably decreased, since any change in strength will be confined to that due to minor tension failures in concrete.

However, if the yield value of the reinforcing is surpassed, it may result in complete loss of prestress and consequent large cracking of the concrete. While failure may not necessarily follow from such cracking, it may be considered as a practical limiting condition for the establishment of a working margin.

If economy in prestressed concrete construction is to be obtained, this margin between maximum stress in steel and yield strength must be made as narrow as practicable to guard against the possibility of critical overstress. Perhaps, we may have to use varying factors in accordance with the type of framing, condition of loading and the method of prestressing. In this connection, we must also give some further thought to the desirability of allowing some tensile strain in the concrete. As stated in the editorial, should such a practice result in some cracking of the concrete, the strength or adequacy of the framing will still remain unimpaired.

V. Vahrikian
Head Designing Engineer
Bureau of Yards & Docks
Navy Department
Washington 25, D. C.



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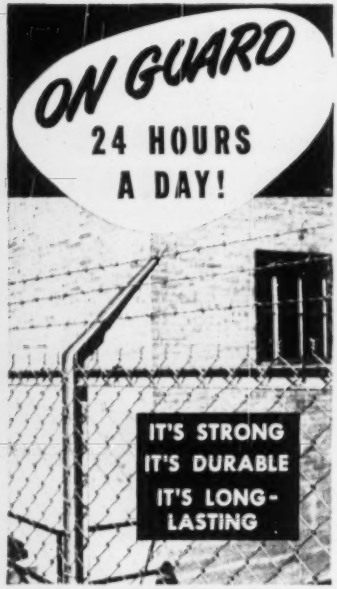

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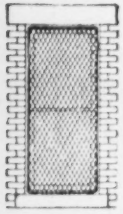

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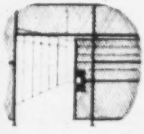

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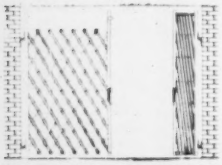

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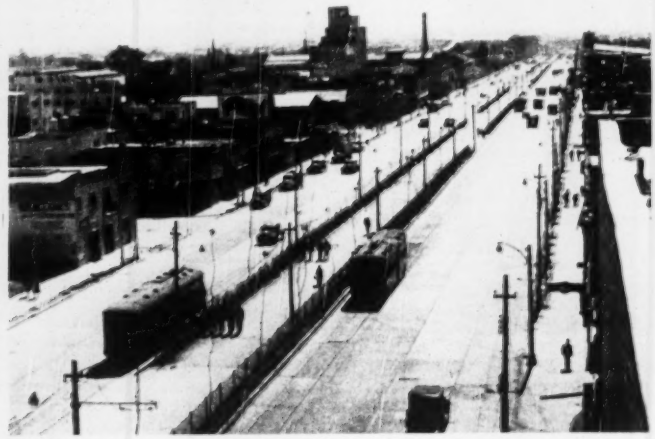


GUADALUPE BOULEVARD—This picture shows the cut made through a depressed area in Mexico City for the new Guadalupe thoroughfare, a 6-lane highway which is part of the extensive plans to speed up traffic in the capital city. (Mayo Photo.)

Geological Survey men help foreign countries

Evidence of the technical assistance the United States is already giving to foreign lands, even ahead of Point 4, is offered by the news of recent overseas assignments for several Geological Survey men.

George C. Taylor Jr., geologist, has gone to New Delhi, India, to confer with officials of the central government and the geological survey of India on that country's groundwater problems. Originally he was scheduled to go to Saudi Arabia to aid in groundwater researches there, but the shortage of qualified personnel made it necessary to assign him first to India. He is a graduate of the University of New Mexico. He did graduate work in geology at Harvard and joined the survey in 1937. His special field is groundwater geology and geomorphology.

At the request of the government of Saudi Arabia, Glen E. Brown, another geologist, has left Bangkok, Thailand, for Jidda, S.A., to conduct a country-wide water survey. He is making the study under the international information and educational activities program of the Department of State. The survey will be important to Saudi Arabia for future economic planning, including prospective reclamation and conservation programs.

Brown has been with the Thailand mission for the last six months, along with William D. Johnston, Jr., chief of the Geological Survey's Alaskan and foreign geology branch. He is a graduate of the New Mexico School of Mines, and he took his Ph.D. at Northwestern University. He joined the Survey in 1938 after two years as geologist with the Philippine Bureau of Mines.

Paul H. Jones, geologist in charge of ground water investigations for the Survey in Louisiana, has arrived in Chile to aid in a 30-day study of underground waters affecting a major irrigation project.

The work to be done at Chilean expense under Public Law 402 which authorizes the State Department to give scientific and technical assistance and training grants to the American republics and to countries of the Near and Far East.

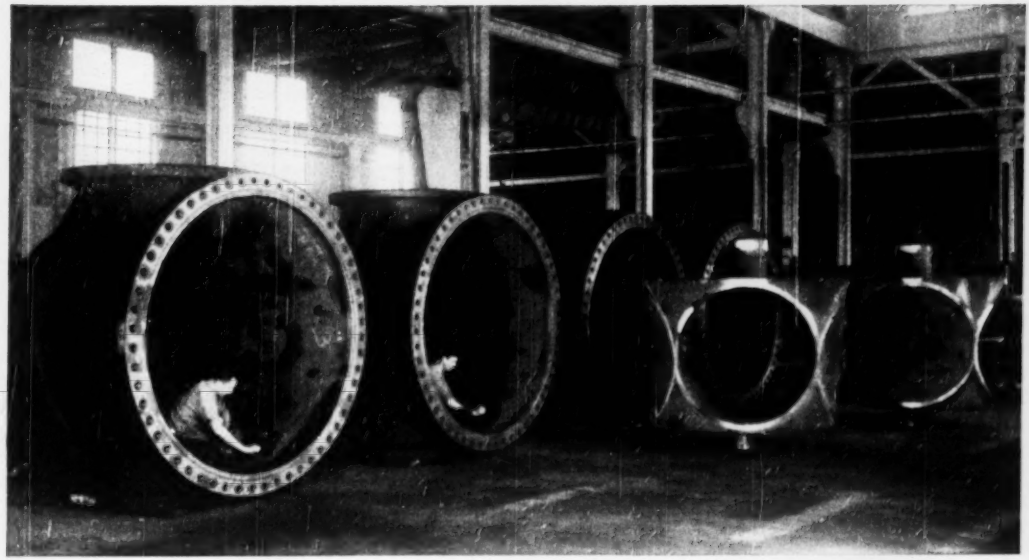
Jones got his bachelor's degree in geology from Michigan State College in 1940. He worked during 1941 and 1942 with the Halliburton Oil Well Cementing Co. in Texas, and joined the Survey in 1942 as a petroleum geologist.

ECA electric power plan for Greece is ready

A report by Ebasco Services, Inc., New York, blueprinting an integrated electric power program for Greece has been transmitted to the government of that country by the U.S. Economic Cooperation Administration.

The report, resulting from a year's field survey by the American engineers, recommends a 6-year construction program to cost the equivalent

(Continued on page 54)



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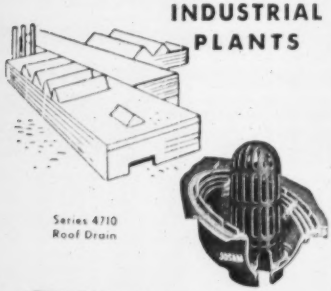

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of $212,360,000, and to treble Greece's electric power output.

A modern, integrated electric power system is called for which would utilize Grecian water power and lignite, and eventually supply power for the entire mainland of Greece. Present electric power capacity in the country is only 153,000 kw. The proposed new system would raise this to 496,000 kw.

It is emphasized that any such program as that outlined in the engineering report depends on Washington approval and is also contingent upon the Greek government's paying the local costs of the development. This might necessitate tax reforms and other measures to achieve efficient administration and financial stability.

Important road projects under way in Peru

Two important developments have taken place recently with regard to Peruvian roads. This is timely since Peru is to be host to the Fifth Pan American Highways Congress to be held in Lima next October.

The Ministry of Development and Public Works of Peru has made an agreement with the U.S. Bureau of Public Roads for technical advice and assistance in improvings major highways, developing secondary highways, and standardizing motoring regulations in that country.

The Peruvian Roads Association, affiliate of the International Road Federation, is working with private funds, toward similar ends. About 550 communities in the country remain without roads. Very slowly the coastal Pan American Highway is being improved, asphalted and widened to three lanes, and special attention is being given also to the improvement of the branch road from Pocsmayo on the coast to Cajamarca, and to the Central Highway from Lima to Pucallpa. There is also some important bridge building—the San Alejandro cantilever bridge, the Piura River bridge and the Fortaleza suspension bridge on a single road beyond Quimicuil in the gold area of southeastern Cuzco.

India—Fred H. Kellogg, chairman of the department of civil engineering at the University of Mississippi and a consulting engineer for the Tennessee Valley Authority construction department, has a leave of absence to go to India to act as consulting engineer on the Nangal hydroelectric project in East Punjab province. His work will be near Simla, where the Westinghouse International Electric Co. is building a dam for power development.

Foreign Briefs

Water tunnel—Fifty feet below the Thames at Shell Haven, near Southend, Essex, England, miners are building a 9-ft dia. tunnel 900 ft long to carry cooling water which will help operate a giant new refinery of the Shell Petroleum Co. now under construction on a 200-acre site.

Asbestos cement pipes—After years of research, Yugoslavia is now substituting asbestos cement pipes for imported rolled steel pipes for artesian wells. Advantages claimed are lightness, economy, ease of drilling or cutting, and the fact that it is acid-, rust- and water proof.

Underground power plants—Norwegian government engineers are blasting under mountains to install underground hydro-electric power plants to be proof against any possible aerial attack. Five such plants have been completed and 14 are now under construction. The 19 plants will generate 1,500,000 kw.

463,701 new homes—In three years after the war, Great Britain has built 463,701 new homes for bombed-out families.

Crawler tractors for Australia—R. G. Casey, Minister for Supply and Development, Australia, is asking Australian engineering firms to consider the production of crawler tractors. He said that manufacturers prepared to tool up would receive every possible help from the government. Australian production of construction equipment is below requirements mainly because of the lack of sufficient steel.

Milan housing—Of the 245,263 rooms destroyed by wartime bombing in Milan, Italy, 212,940 have been rebuilt or replaced. The city's population is now 1,115,000.

Low Cost Housing—Governor Luis Munoz-Marin has approved the construction plan submitted by Fullans Construction Co. of San Juan for low-cost housing in various cities in Puerto Rico. The houses will be entirely of reinforced concrete. With the exception of the footing, the whole house is poured monolithic. The largest type of house on a 3,000 sq. ft. lot will be sold for $3,950. It will have three bedrooms, a living-dining room, kitchen, bathroom, and a covered porch. There will be 30 different styles to break the monotony. Areas will be reserved for parks, schools, and commercial centers. Financing is done through the Federal Housing Administration.

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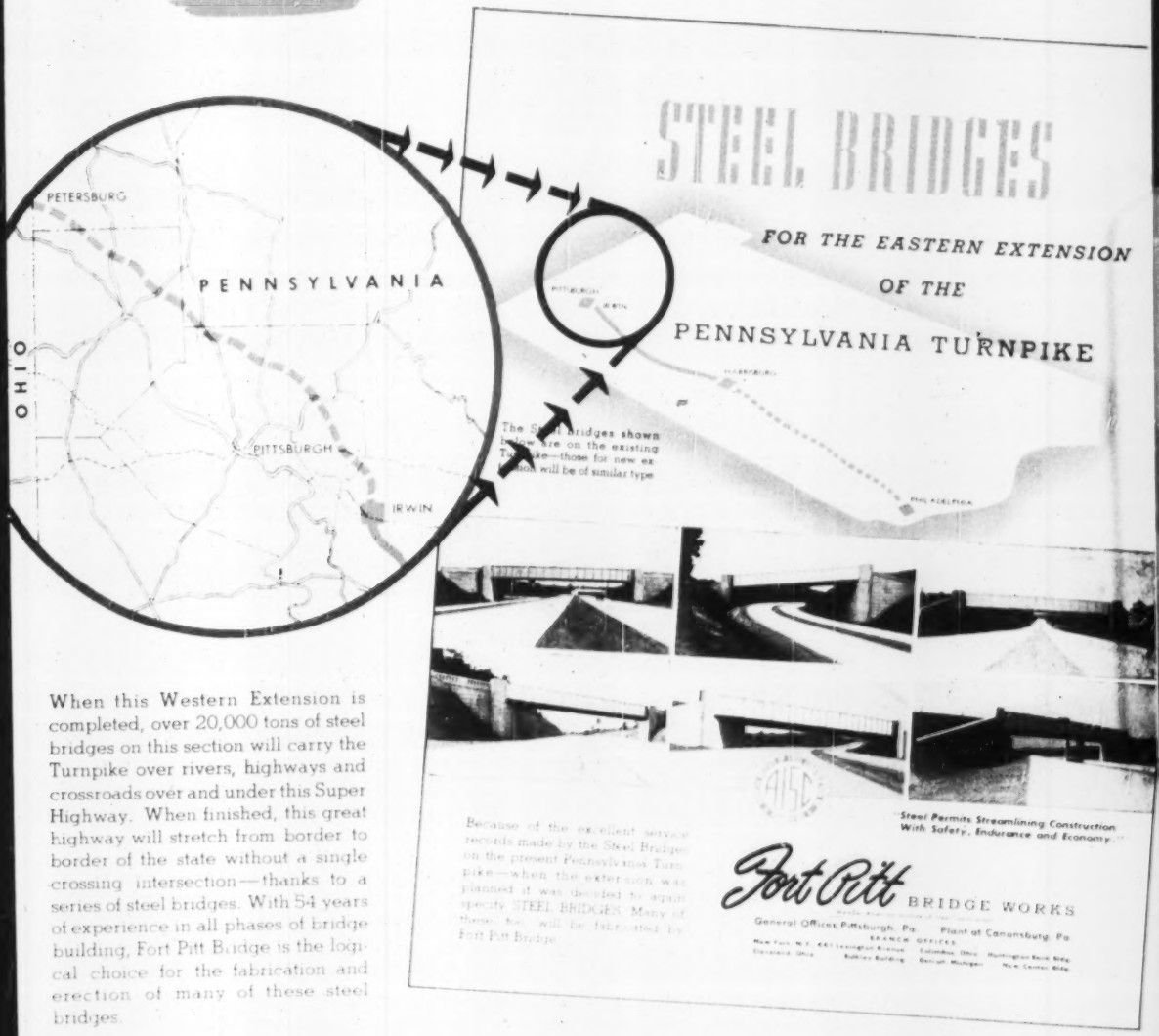

When this Western Extension is completed, over 20,000 tons of steel bridges on this section will carry the Turnpike over rivers, highways and crossroads over and under this Super Highway. When finished, this great highway will stretch from border to border of the state without a single crossing intersection—thanks to a series of steel bridges. With 54 years of experience in all phases of bridge building, Fort Pitt Bridge is the logical choice for the fabrication and erection of many of these steel bridges.

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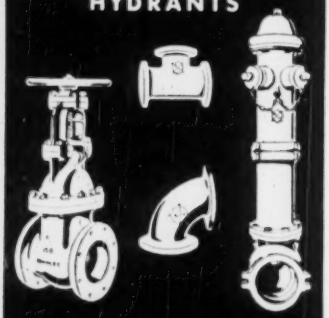

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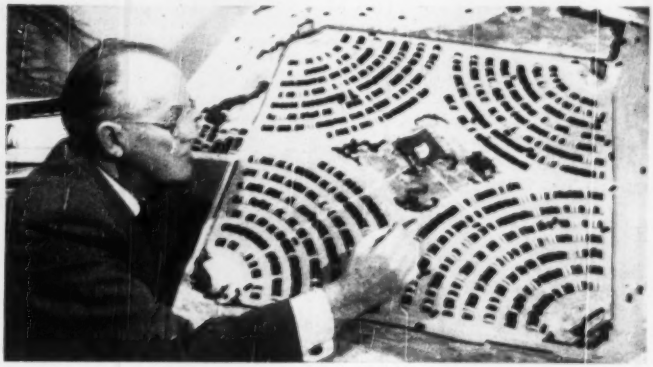

DRIVE-IN THEATER—Audiences of tomorrow may have their cars washed, hair shampooed and set, laundry washed, shoes soled, pants pressed and dog de-loused while 4 screens are served at once from a single center projection booth. This new design in drive-in theaters costs one-third to one-half less to build, brings all cars within 300 ft of the screen and may be loaded and unloaded in 12 to 15 minutes. Units, now under construction in Chicago and St. Louis suburbs, are patented by Lewis Eugene Wilson, veteran Los Angeles theater designer. (World Wide Photo)

Urge quake protection in N. W. building codes

All cities of the Pacific Northwest should add mandatory earthquake protection provisions to their building codes, engineering and technical societies have recommended to the Association of Washington Cities. Ten months of study under the guidance of the Pacific Northwest Conference of the American Society of Civil Engineers went into the report.

First phase of a comprehensive earthquake report, the study was begun following the serious earthquake of last April.

"Earthquakes are normal, natural phenomena of this region, to be expected to occur from time with equal or greater severity than those of record," the report pointed out.

Cities are urged to adopt provisions of the uniform building code of the Pacific Coast Building Officials Conference, 1949 edition. This code covers new construction only. It has been approved unanimously by the 22 members of the Puget Sound Engineering Council, including engineering, architectural and technical groups.

Regulations for the repair of existing construction that would be hazardous in future quakes will be considered under the second phase of the study, according to Prof. Alfred L. Miller of the University of Washington civil engineering department, chairman of the regional engineering earthquake committee.

"We have hopes that every city in the state will adopt the committee recommendations within a year," said Prof. Miller. The second report, for the correction of parapet walls and building appendages, is expected to be more controversial.

Sewage and Garbage

Toledo, Ohio—City will enter into a contract with the Toledo Frazer Compost Co. to erect a plant to handle 6,000 tons of garbage yearly, about one-fifth of the city's output. It is estimated the city will save $40,000 a year in trucking and incineration costs. The compost will be sold for fertilizer.

Los Angeles, Calif.—Because of an estimated yearly operating cost of more than $1,000,000 for the Los Angeles Hyperion sewage treatment plant and ocean outfall, plans have been revived for a sewer service charge on all water meters. The Board of Public Works expects a State Health Department order to put units in operation as soon as they are finished so that long-standing beach quarantines may be removed.

Greenville, Pa.—The Businessmen's Association has purchased from the government for $15,000 the sewage disposal plant at the former Camp Reynolds, said to have cost nearly $2,000,000. The group will operate it until arrangements are made to have Greenville borough take over.

maintenance. Greenville council has discussed extending the town's sewers to Camp Reynolds rather than to enlarge the present disposal plant. The camp sewage disposal plant is now being operated for residents of Reynolds Village, a housing project erected during the war.

Miami, Fla.—The idea of an ocean outfall for Miami's sewage has been rejected by the city commission. Instead, the commission voted favorably for a complete treatment plant estimated to cost $2,750,000 more than the outfall, and from $172,000 to $212,000 more a year to operate.

Altoona, Pa.—The sewer authority is proceeding with its plans of building two disposal plants and revamping the sewage system. The $3,500,000 project will be completed over a 4-year period. First phase of the project is expected to cost $1,400,000.

Newburyport, Mass.—The city council has voted approval of a survey on the advisability of building a $536,000 sewage treatment plant as the first step in a drive to end the pollution of the Merrimack River. Thus Newburyport becomes the first of the Merrimack Valley communities to show an interest in the federal government's offer of funds to survey the possibility of eliminating sewage and industrial waste pollution there. Thomas A. Berrigan, chairman of the Merrimack River Valley Sewage Board, declared that the best means of cleansing the river would be by a series of regional disposal plants rather than by a trunk sewer emptying off Salisbury Beach or Plum Island.

Knoxville civic center

Mayor J. W. Elmore, Jr., of Knoxville, Tenn., has proposed a $5,000,000 civic center featuring a municipal building, an auditorium and a large-scale parking area.

The preliminary plan, as outlined by the mayor, provides for construction of a skyscraper-type of building to house city, county and federal offices, with an adjoining auditorium to seat from 6,000 to 8,000 for conventions, sports events, concerts, etc., and an area of approximately 11 acres to provide parking space for 2,000 automobiles.

Much of the land required for this proposed development is now owned by the city, and this fact together with the probable sale of city property which would be vacated, is the reason for the low estimate of total cost.

The city council has authorized a committee to study the project and report its findings.

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Any compressor produces its rated capacity, of course. But when you figure the extra service you get from a Le Roi Compressor — the longer life, the lower maintenance costs — you quickly realize why you get more air for less money! And slow piston speed is only one of the many Le Roi design features which keep costs down. Your Le Roi distributor can show you this cost-saving advantage and all the others. See him today or write us for latest catalogs on 60 to 600 CFM compressors and Le Roi-Cleveland rock drills.
— and use Le Roi-Cleveland air tools for still lower costs
Experienced distributors everywhere to give prompt service on the job!
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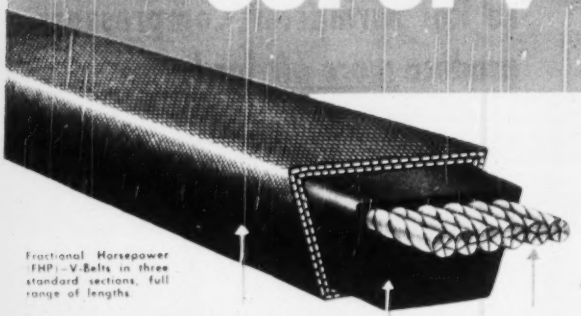
BWH

DEPENDABLE RUGGEDNESS

BULL DOG V-BELTS demonstrate how to get the most out of V-Belts

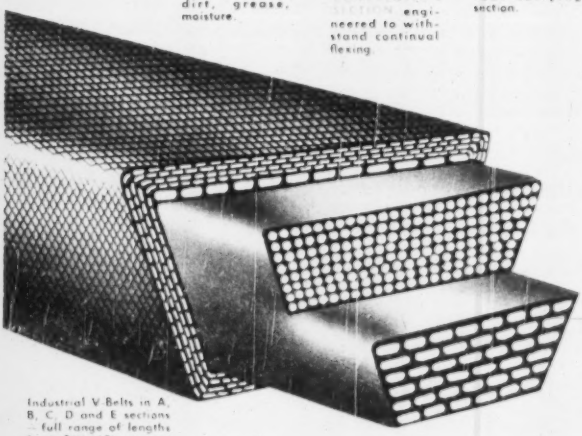


Fractional Horsepower (FHP) V-Belts in three standard sections, full range of lengths.

WEAR RESISTANT COVER protects heart of belt from dirt, grease, moisture.

COMPRESSION SECTION engineered to withstand continual flexing.

BULL DOG CORD powerful load-carrying section.



Industrial V-Belts in A, B, C, D and E sections — full range of lengths from 26"-660".

OUTSTANDING ADVANTAGES OF BULL DOG V-BELTS

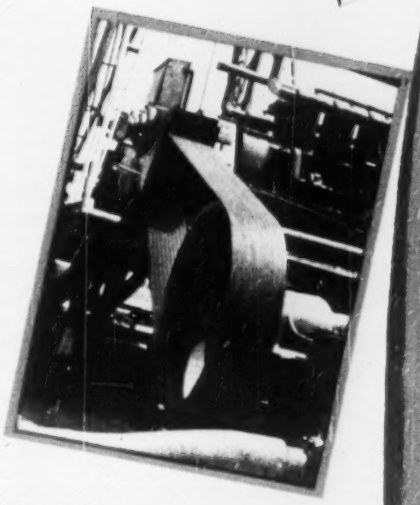
1. Fewer Maintenance Headaches. Because BULL DOG V-BELTS require less adjusting and last longer, they save time, money and worry in maintenance.

2. Longer Belt Life. Because new, quality-controlled compounds developed in BWH laboratories run cool, don't crack or deteriorate under severe flexing.

3. Backed by BWH Reputation for Extra Service. In the 72 years that BWH has been a leader in the mechanical rubber manufacturing field, BWH products have built steady fame for outstanding performance. BULL-DOG V-BELTS fully live up to BWH reputation for dependable ruggedness.

Efficient V-Belt operation insures steady, smooth, low-cost power transmission, without maintenance worries, over long periods of time. And that's exactly the kind of economical, worry-free service BULL DOG V-BELTS deliver in all types of industry.

Each job has its own problems, however. Here are some of the common ones that engineers report in V-Belt operation, with BWH solutions:



PROBLEM	SOLUTION
Excessive Cover Wear on V-Belts	Check sheaves for worn grooves. Check alignment between sheaves. Check to see that sheaves are tight on shafts.
Covers Loosen . . Rubber Gets Soft and Sticky	Check for excessive oily conditions. If contact with oil or grease cannot be prevented, then specify BULL DOG HSO V-BELTS, which are oil resistant. (Also heat resistant and static conducting.)
V-Belts Failing Within Few Hours of Installation	This is usually caused by prying V-Belts over edge of sheaves, causing internal cords to break. Correct method of installation is to move motor of driven machine until belts do not have to be forced onto sheaves. Then move motor back until sufficient tension is applied.
New V-Belt Installed As Replacement Fails, While Old Belts Continue Running	Never install a new belt in a set of old belts, because it will be either shorter or longer than the old belts. If shorter, it will be excessively overloaded and fail. If longer, it will not transmit an equal share of the load. Always install a complete new set of belts and retain old belts for an emergency, or for temporary replacement if needed.

It will pay you to investigate BULL DOG V-BELTS on your next installation. They have what it takes for smoother operation on both FHP motors and on high-powered industrial jobs.

HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems. We're specialists in solving them. Consult your nearest BWH distributor or write us direct.

FOR ALL MECHANICAL RUBBER GOODS CONSULT BWH

Established in 1878, BWH is today one of the world's largest manufacturers of mechanical rubber goods. Among the quality famous BWH products which are today helping industry to do better jobs at lower cost are the following:

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ELEVATOR BELTING	STEAM HOSE
TRANSMISSION BELTING	WATER HOSE
AIR HOSE	OIL FIELD SUPPLIES
CONTRACTORS HOSE	FRICTION TAPE
FIRE HOSE	SPLICING COMPOUND

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about the new
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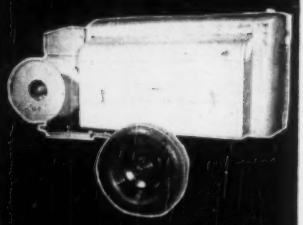
105-P
Compressor



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Powered with the new Chrysler 105 Industrial Engine with 317 Cubic inch displacement. Delivers 105 cubic feet per minute. Sodium cooled valves and Stellite valve seats in engine. Stainless steel disc type valves and Manganese Bronze seats in compressor. Smooth even flow of air. Self starter, battery ignition, voltage regulator, large radiator capacity with thermostat for quick warm-up. Heavy duty with light weight (1700 lbs.).

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The New SMITH
MODEL 70-P COMPRESSOR

SMITH
Air Compressors
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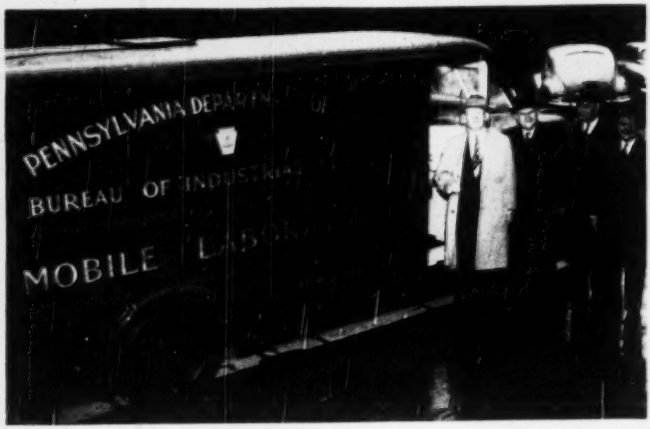
EDUCATION and RESEARCH



ANTI-SMOG WEAPONS—Pennsylvania's Department of Health will use this mobile laboratory in its campaign against air pollution in industrial communities and facilities. It was designed and built by Mine Safety Appliances Co., Pittsburgh, and will be used by the department for on-the-spot studies to determine causes and degrees of air contamination. Among its equipment is a power generator and propane storage tanks. It has meteorological equipment, too. Left to right, are: Governor James H. Duff; George H. Deike, Sr., president, Mine Safety Appliance Co.; Dr. Norris W. Vaux, secretary of the Department of Health; and Dr. Joseph Shilen, director of the Industrial Hygiene Bureau.

New courses offered on transportation, traffic

Opportunities for advanced engineering students to undertake college study in transportation and traffic are offered by the Institute of Transportation and Traffic Engineering at the University of California, at Berkeley and Los Angeles.

While courses are available in all phases of transportation, the institute's major activities are at present concerned with highway engineering and traffic and airports. Graduate students have wide latitude in the selection of specialties and in the development of study and research programs suited to their backgrounds and objectives. Courses and seminars in transportation offered by the college of engineering can be augmented with courses in transportation, planning and administration offered in such other departments of the university as business administration, economics, city and regional planning and political science.

Faculty News

Lee H. Johnson, Jr., dean of the school of engineering of the University of Mississippi, has been named dean of the college of engineering of Tulane University, effective July 1. He succeeds Dean James M. Robert, who retires after 44 years of service at the university, 14 as dean. Dr. Johnson has been dean of engineering at the University of Mississippi since 1937. Prior to that time, he was on the staff of the United States Waterways Experiment Station at Vicksburg, Miss., and a faculty member at Harvard. He got his master of science degree from Harvard in 1932 and his doctor of science degree in 1935.

Jean S. Mendousse, civil engineer and a member of the French Military Mission in 1945, has been promoted to associate professor of civil engineering at Catholic University, Washington, D. C. He served with the French forces in North Africa during the war.

William R. Osgood, authority on the behavior of engineering materials, has joined Armour Research Foundation of Illinois Institute of Technology as a research engineer. Since 1946, he has been with the Navy Department, where he did technical liaison work between the Navy and its contractors. From 1929 to 1946, he was a materials engineer for the National Bureau of Standards in Washington, D. C. He served as assistant professor of structural engineering at Cornell University from 1926 to 1929 and was an instructor in theoretical and applied mechanics at the University of Illinois earlier.

Educational Notes

Jobs for graduates—Less than 15% of the 600 potential graduates in engineering at the University of British Columbia at Vancouver expect to have jobs to go to when they leave the university this spring. Large eastern industries, which normally send recruiting teams to UBC, have shown little interest this year, according to R. E. Wilkins, registrar-manager of the B. C. Association of Professional Engineers.

Engineering lab—A new $100,000 engineering laboratory for the South Carolina State A. & M. College for Negroes has been approved by trustees.

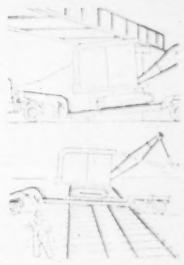
More money for MIT—Including a recent gift of $1,000,000 from John D. Rockefeller, Jr., the total received toward the $20,000,000 development program of the Massachusetts Institute of Technology is now $12,162,309.

To study blasting caps—A study of blasting caps used with explosives will be made by the University of Missouri School of Mines and Metallurgy. Dean Curtis L. Wilson explained that the work will be done primarily to determine whether there is any difference in the gradation and volume of broken rock resulting from any given blast by using different types of blasting caps. The types to be used are instantaneous electric caps, delay electric caps, and short interval delay caps, which are known as split second delay caps.

Dorm at Case—Ground has been broken for a dormitory to house 308 men at Case Institute of Technology at Cleveland, Ohio. Outside dimensions will be 272x59 ft. J. Trevor Guy, architectural engineer at Case, made the preliminary plans, and the architects are Small, Smith & Reeb. Cost of one of the three units has been guaranteed by an alumnus. Total cost is estimated at less than $700,000. Contract has been awarded to the Gillmore-Carmichael-Olson Co. of Cleveland.

New student chapter—The 128th student chapter of the ASCE was installed at the University of Massachusetts, Amherst, March 8. Principal speaker was Albert Haertlein, Gordon McKay professor of civil engineering, at Harvard University and head of the department of civil engineering, Harvard Graduate School of Engineering. Other ASCE representatives were Harold L. Blakeslee, Robert H. Dodds, and Don P. Reynolds.

The ROGERS 4-FEATURE POWER-LIFT DEMOUNTABLE GOOSENECK



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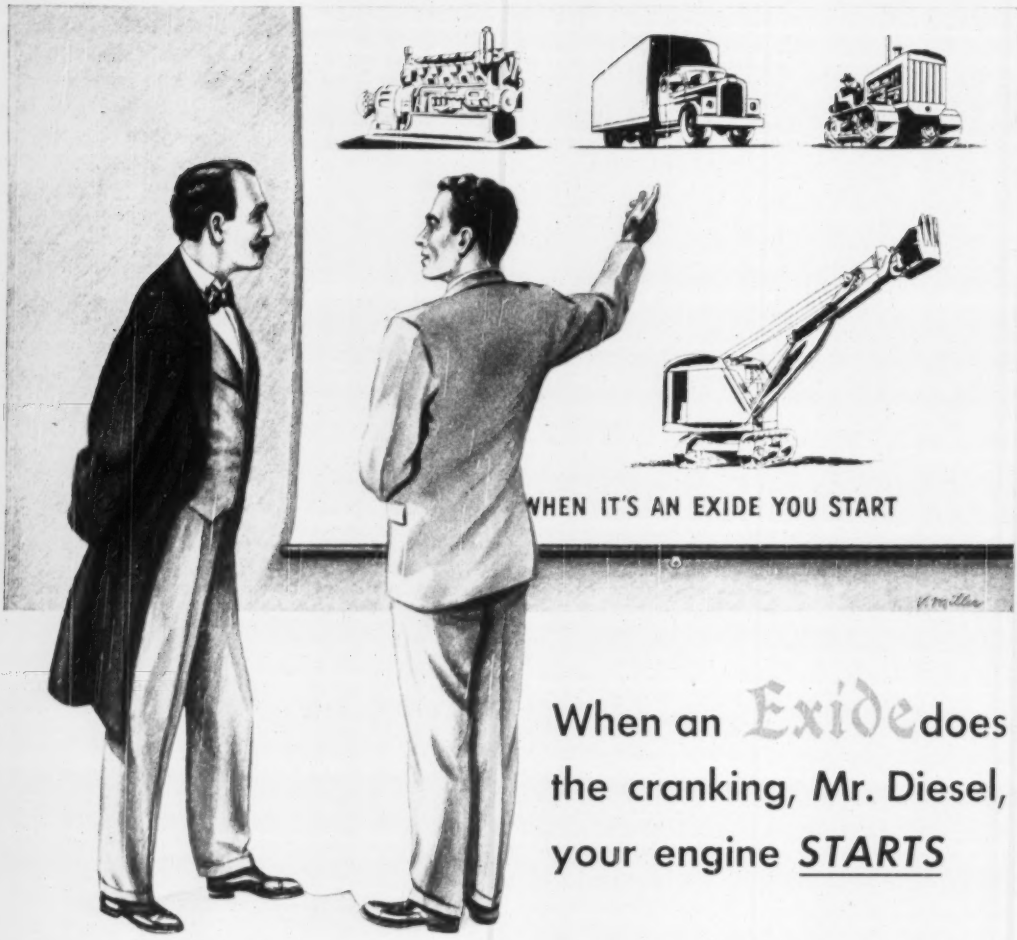


When an Exide does the cranking, Mr. Diesel, your engine *STARTS*

You can count on sure starting, because an Exide Battery is built specifically for the job . . . built to deliver the mighty surge of cranking power a Diesel engine needs.

Whether you're a manufacturer or operator of Diesel engines and Diesel-powered equipment, that means you can depend on your Exide Diesel Cranking Batteries for:

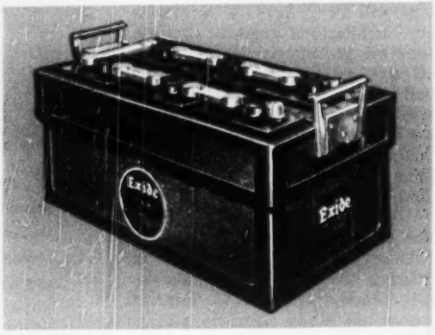
- high maintained voltage—*a quick breakaway* and *high cranking speeds*.

You also get:

- long life—low depreciation, less frequent replacements.
- low costs—operating, maintenance, repair.
- rugged construction, for heavy-duty service in all climates.

For maximum economy and dependability, use Exide Batteries for all your Diesel cranking—buses, trucks, trailer-tractors, off-the-highway equipment, ships, power plants, Diesel-electric locomotives.

TO HELP YOU GET TOP CRANKING performance, Exide's Engineering Staff, the largest in the industry, will be glad to help you solve any of your Diesel-cranking problems.



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Men and Jobs

Rear Adm. Leo O. Colbert, a civil engineer whose entire professional career of over 42 years has been with the Coast and Geodetic Survey, has retired. A graduate of Tufts College, 1907, he entered the Coast Survey at once and successively he became navigator, executive officer and commanding officer. During his service as chief of the Division of Charts in the Washington office, from 1933 to 1938, the Survey completed 87 aeronautical charts, and many new basic marine charts also were produced.

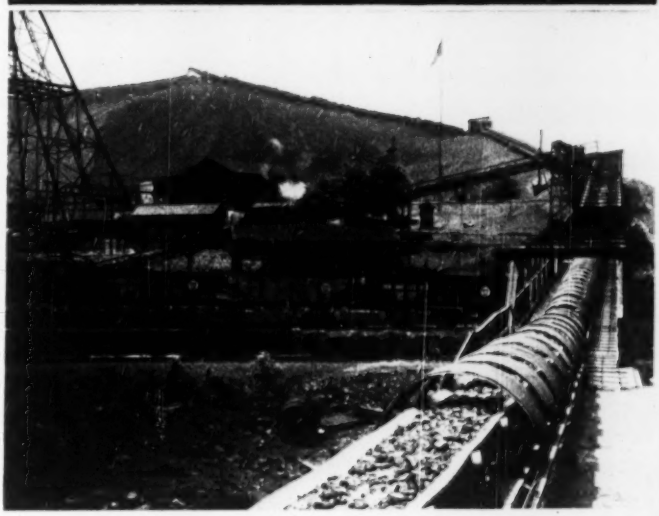
Maj. William W. Vance, of the Corps of Engineers has been awarded the Commendation Ribbon with pendant by Secretary of the Army Gordon Gray for meritorious service as a member of the Army Engineers' Grecian District, North Atlantic Division, from August, 1947, to June, 1949. Major Vance served as executive and special assistant to the Grecian District engineer. The district, now disbanded, was established to carry out an extensive reconstruction program in Greece, involving the rehabilitation of highways, airfields, waterways, railroads, ports and bridges. The work, performed despite continued guerilla attacks and severe weather, was part of the Interim Aid Program authorized by Congress in 1947.

Herbert A. Moody, hydraulic engineer of the Western Massachusetts Electric Co., for the last 37 years, has retired. He entered the service of the predecessor Turners Falls Power & Electric Co. in 1913, and was identified with the design and construction of the Cabot station, the Cobble Mountain plant on Westfield Little River, and subsequently on hydro developments on the system.

Paul B. Coffman, president of Standard Research Consultants, Inc., has been elected executive vice president and general manager of Overseas Consultants, Inc., consulting firm which recently signed a contract with the government of Iran to serve as consultants and advisers on that country's $650,000,000 development program which has already started.

Joseph Banta has become city engineer of Shelbyville, Ind. He has been serving as director of the city and county plan commissions at Marion, Ind.

BELTING
BUILT FOR THE TOUGH JOBS!



HEWITT-ROBINS Conveyor Belting gives longer service at less cost

When trouble comes by the ton . . . whether it's heavy abrasives like ore and rock or wet, gritty materials like fines and slag . . . the easiest, most dependable and most economical way to move it is on a Hewitt-Robins conveyor belt.

For over half a century the Hewitt Rubber Division of Hewitt-Robins Inc., has pioneered in making the right belt for every conveyor installation. Today, engineers the world over instinctively specify Maltese Cross® where the going is really tough, Ajax® for general service, and Conservo® for lighter applications and portable conveyors.

In Hewitt Rubber belting they get full protection against moisture, oils, flexing and ply-separation, as well as treatment against mildew. They get abrasion-resistance from extra-tough rubber covers, heavily textile-reinforced for maximum strength plus flexibility.

* * *

Engineers turn to Hewitt-Robins not only for belting but for entire belt conveyor systems. They know Hewitt-Robins is *the only firm able to accept complete responsibility.* For belting, address Hewitt Rubber Division, Buffalo 5, N. Y.; for machinery, Robins Conveyors Division, Passaic, N. J.; for engineering services, Robins Engineers Division, 157 Chambers St., New York.

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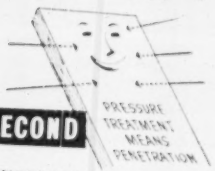
All engineers should know these facts about pressure-treated lumber

FIRST

PROTECTION—Treating of lumber preserves it—just as alloys preserve metals. The purpose is to protect lumber against costly rot and termite damage.



SECOND

PRESSURE TREATMENT vs. Surface Application—Authorities say that pressure treatment provides the only *sure, lasting* protection to lumber.

THIRD

OTHER QUALITIES To LOOK FOR—For greatest usefulness, preservatives also should be clean, odorless, paintable, non-leaching and non-corrosive.

For complete information about WOLMANIZED Pressure-Treated Lumber, write for free booklet.

FOURTH

WOLMANIZED Pressure-Treated Lumber combines *all* these requirements—*lasts 3 to 5 times longer* than untreated wood, because it's treated under 150 lbs. pressure per square inch. Protection is deep in the wood fibers. It's clean, odorless, paintable, non-leaching, non-corrosive. Wolmanized Pressure-Treated Lumber has been proved in use for over 25 years. It will prove its value to you, too.

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It pays to use... WOLMANIZED PRESSURE TREATED LUMBER

Miss Elizabeth M. Herlihy is retiring as chairman and executive secretary of the Massachusetts Planning Board. A pioneer in her field, Miss Herlihy was secretary of Boston's first planning board and became chairman of the state board when it was created in 1914. She has lectured and written on public planning and zoning, and has directed many surveys and studies in connection with public improvements.

Edgar E. Foster of the Branch of Project Planning, U. S. Bureau of Reclamation, Denver, Colo., has been loaned for three months to the Department of the Army, Far Eastern Command, to serve as consultant on irrigation and drainage for land reclamation on the Ryukyu Islands.

John Shepard Parke, vice-chairman of the New York City Housing Authority for the last two years, has been re-elected. He was appointed to the authority by Mayor La Guardia and reappointed by Mayor O'Dwyer. He has been executive vice-president of Presbyterian Hospital since 1943. An expert in architectural engineering, Mr. Parke was associated for 20 years with Marc Eidlitz & Sons, Inc., now known as Vermilya-Brown Co., Inc. He supervised the construction of a large number of institutional buildings, including Columbia Presbyterian Medical Center, Mary Harkness Home in Portchester, N. Y., Memorial Hospital, Spellman Pavilion at St. Vincent's Hospital, and the new library at Columbia University.

Richard King Hale, 70, of the Massachusetts Public Works Department, has retired. He has been supervising waterways projects in Boston and Massachusetts every since his appointment as an associate commissioner of waterways in 1919. His greatest accomplishment is believed to be the filling in of land, construction of runways and supervision of building planning at the state's airport at East Boston. Mr. Hale is an authority on flood control, beach erosion and prevention of hurricane damage on the islands off Massachusetts and Cape Cod shore areas. He is a graduate of Harvard University, 1902.

James W. Gaynor, director of management of the N. Y. City Housing Authority, has been made executive director. He is a graduate of RPI, was a lieutenant colonel in the Army Corps of Engineers, and for two years he served as executive to the chief engineer, India-Burma theater in the late war.

Continued on page 67

DO YOU WANT THE FACTS?

ABOUT EFFICIENT INSULATED PIPING SYSTEMS

Every designer and engineer responsible for the insulated piping systems in various industrial, commercial, and residential developments will welcome the complete descriptive technical information found in the series of catalogs and data books recently published on Ric-wiL Prefabricated Insulated Piping Systems.

Publication of these books is in keeping with the Ric-wiL policy established forty years ago of providing not only the finest insulated piping and accessories but also complete technical information for users of Ric-wiL products.

There are five books in the series, each of which deals with specific phases of insulated piping design, engineering, and installation.

Section 480-2—Engineering Data—A comprehensive data book containing pertinent engineering data as applied to insulated piping and steam distribution.

Section 480-3—Typical Engineering Drawing—Consists of a series of typical engineering drawings for insulated piping.

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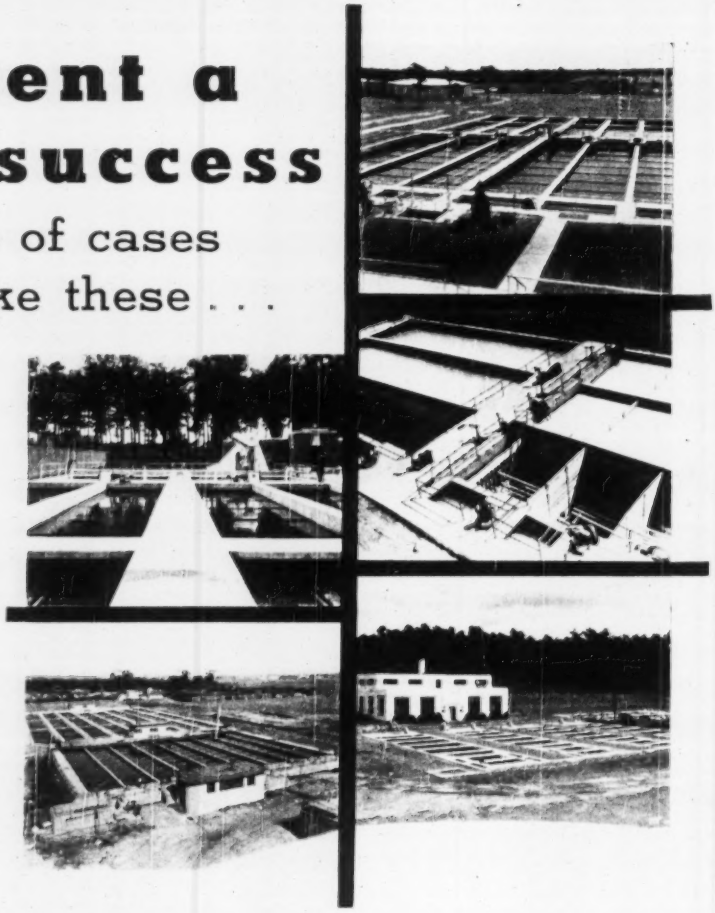

Five Jeffrey-equipped treatment plants are shown here. They include towns and cities serving populations ranging from 1500 to several million. Find out about Jeffrey Collectors, Bar Screens, FLOCTROLS, Grit Washers, Sludge Elevators, Scum Removers, Chemical Feeders, Screenings Grinders, etc.

When you really want to correct your ills you go to a specialist. That is just good sense. Many cities with growing pains have called in Jeffrey, M D (Mechanically-Designed) for equipment to treat water and sewage effectively. Jeffrey Sanitation Engineers are specialists. You can turn your problem over to them with full confidence for it's a TREAT TO GET GOOD TREATMENT.

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Philip J. Cruise, secretary of the N. Y. City Housing Authority, has been made assistant to the chairman. He has a B.S. degree in engineering from Manhattan College. He entered public service in 1924, holding various posts in the old Dock department, Board of Transportation, Topographical Bureau, and the highway department of Queens. From 1929 to 1947 he was with the Park Department, latterly as assistant executive officer of the department.

George R. Genung, deputy director of management of the N. Y. City Housing Authority, has been made director. He joined the staff in 1935 and became deputy in 1936. He is a civil engineering graduate of Columbia, 1913.

Lieut. Col. L. E. Cox, Washington, D. C., Assistant Engineer Commissioner, will leave for duty in Europe soon, having been assigned to Bremerhaven, Germany. Having gone to Washington in 1947, Cox is the senior, in point of service, of the three assistants to Brig. Gen. Gordon R. Young, Engineer Commissioner. He is in charge of the Department of Highways and the Department of Vehicles and Traffic. He holds a master of science degree in civil engineering from MIT, and served 2½ years in the China-Burma-India theater.

Col. John Triscot, resident engineer at the Blakely Dam project, Arkansas, has been reassigned to Fort Knox, Ky., as post engineer, and will be succeeded at Blakely by **John Shewmake**, resident engineer at Narrows Dam near Murfreesboro, Ark.

Walter H. Frick, having concluded an active tour of military service, has reestablished his office as consulting architectural engineer, at 950 Century Bldg., Pittsburgh 22, Pa.

A. E. O'Neall, resident engineer for Smith and Gillespie, and **H. H. Brush**, construction superintendent for Ivy H. Smith Co., seem to agree that things have gone well on Orlando's almost-completed $984,000 sewage plant. Both firms are located in Jacksonville, Fla.

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UNITED STATES STEEL

This Bailey Open Channel Meter indicates, records and integrates sewage flow at a mid-west plant. Wall or panel mounted registers are also available.

For Sewage Measurement

The

BAILEY OPEN CHANNEL METER

A Reliable Register for Low Cost, Trouble-Free Service

FEATURES OF BAILEY OPEN CHANNEL METERS

1. Low Cost
2. Totalize Multiple Flows
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4. Return Accuracy
5. Self Cleaning
6. Easy to Install
7. Easy to Maintain
8. Simple Chemical Feed Controls
9. Rate of Flow and Ratio Controls

Bailey Open Channel Meters indicate, record and integrate the flow of sewage, sludge, industrial wastes and irrigation water. They may be used with all types of flumes, weirs and open flow nozzles.

Electronic or direct mechanical registers may be furnished. Electric, electronic or air control may be provided.

Write for Bulletin 62

MU-24

BAILEY METER COMPANY

1029 IVANHOE ROAD • CLEVELAND 10, OHIO

METERS and CONTROLS for SEWAGE and WATER

BAILEY METER COMPANY LIMITED, MONTREAL, CANADA

Hayward Buckets

Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.

THE HAYWARD CO., 48-50 Church St., N. Y.

MOVING, RAISING, HEAVY SHORING, UNDERPINNING

National Operations

E. F. DAVID HOUSE MOVING CO.

Registered Engineers

1548 SO. VANDEVENTER AVE.
ST. LOUIS 10, MO.
Tel. Grand 3092
Established 1886

A. D. Hutchison, Texas Highway Department senior resident engineer at Greenville, has been made District 1 assistant engineer with headquarters at Paris. He is succeeded at Greenville by **B. L. DeBerry**, senior resident engineer at Emory.

The Virginia highway department has announced that **W. Frank Smith**, district engineer at Fredericksburg, will be transferred to Richmond to head the department's new urban division. **R. I. Mount**, district engineer at Culpeper, will take over Smith's position at Fredericksburg.

Sylvan Baudhuin Jr., a civil engineer and on the faculty of Marquette University, has been appointed superintendent of maintenance and construction for Sturgeon Bay, Wis. He succeeds **Eugene Odbert** who resigned to become director of public works at Portage, Wis.

Barney R. Hodgin, for 17 years a government service engineer, has been appointed Maricopa County engineer with offices at Phoenix, Ariz. He replaces **Julius Irion**, who resigned. He became regional highway engineer for the Soil Conservation Service in 1934 with supervision over New Mexico, Colorado, Arizona and Utah. Later he was assigned to work with the soil and moisture conservation programs.

A. G. Tapley, senior engineer of the department of public works at Halifax, N. S., has resigned after 40 years service.

C. F. Stuart, assistant engineer Canadian National R.R., Moncton, N. B., has been transferred to Montreal.

H. W. Kueffner, director of public works, Durham, N. C., also doubles as city engineer. His main concern right now is a $450,000 street project to open up important industrial development sites.

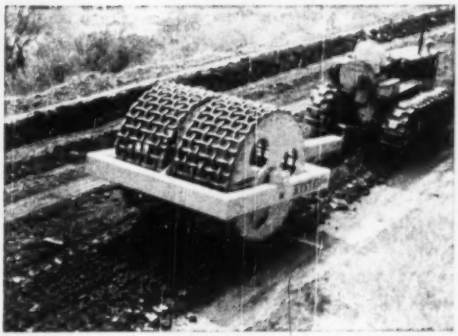
The NEW HYSTER GRID ROLLER

Revolutionizes Black Top Salvage Jobs

HOW IT WORKS...WHAT IT DOES

1. Black top is scarified by motor grader pulling Grid Roller.
2. Scarified black top is pulverized to a maximum of small "fines" by Grid Roller.
3. Pulverized black top is windrowed—road bed cleaned by motor grader—compacted by Grid Roller.
4. Windrow is spread and oil applied, material mixed and relaid and then compacted by Grid Roller. Now ready for seal coat.

SAVES UP TO 50% IN TIME...RECLAIMS MATERIAL



Saving in oil of $343 per mile on a bituminous salvage job. Hyster Grid Roller pulled by a "Caterpillar" D4 tractor.

1. In ONE day ONE man with motor grader and Grid Roller can salvage and prepare ONE MILE of black top road for oiling.
2. Grid Roller produces greater abundance of FINE MATERIAL.
3. Oil usage reduced up to ¾ of a gallon per cubic yard—on one county road job a savings of $343 per mile in oil was effected.
4. Grid Roller salvages all types of black top material. NO NEED TO HAUL AWAY OLD MATERIAL.

Sold exclusively by your "CATERPILLAR" DEALER. CONSULT HIM FOR FACTS, FIGURES, LITERATURE.

HYSTER® COMPANY

2953 N. E. CLACKAMAS, PORTLAND 8, OREGON
1853 NORTH ADAMS ST. . PEORIA 1, ILLINOIS

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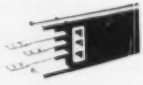

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Forced Fans

Precipitron*

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*Reg. U.S. Trademark

BE SURE...IF IT'S Westinghouse

One reliable source for Everything Electrical . . . to distribute, control and utilize electric power

Badly needed expansion of both government and private hospitals is now bringing construction programs to an all-time peak.

For this type of construction, as well as all other commercial and industrial buildings, Westinghouse offers architects and contractors a unique advantage. *Everything electrical*—from distribution and control apparatus to highly specialized x-ray and lighting equipment—can be obtained through one reliable source.

By centralizing responsibility with Westinghouse for power distribution equipment, construction and building equipment, heating and ventilating equipment and lighting units, you gain important advantages:

1. SPECIALIZED ENGINEERING . . . to assist in selecting and applying equipment for maximum efficiency.

2. SIMPLIFIED ORDERING . . . by providing a focal point of contact for all buying and specification data.

3. SPEEDIER INSTALLATION . . . by centralizing responsibility for delivery and installation.

4. BETTER, MORE RELIABLE SERVICE . . . through the co-ordinated design and construction of Westinghouse equipment, plus broad experience in applying it for all types of buildings. Westinghouse also offers unmatched electrical maintenance service, through its nationwide chain of Renewal Parts Warehouses and Manufacturing and Repair Shops.

Call your nearest Westinghouse District Office or Distributor for full information on this co-ordinated service. When there's CONSTRUCTION AHEAD requiring electrical equipment of any kind . . . you can be *sure* if it's Westinghouse. J-94782-B

LAMPS AND LIGHTING EQUIPMENT

Lighting Equipment

Sterilamps

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Light Bulbs

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Water Heaters

Water Coolers

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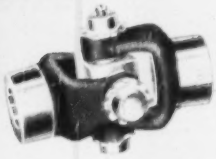
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



for machines that make steel delivered through

BLOOD BROTHERS Universal Joints

The BLOOD BROTHERS Universal Joints for this 2-stand Tandem Skin Pass Mill, and for other steel-making products of UNITED ENGINEERING AND FOUNDRY COMPANY, have the characteristics demanded for such machinery: tremendous strength and capacity for excessive shock load or starting load. Each joint and shaft assembly meets the most rigid inspection standards.

For big machines or small, industrial installations or commercial vehicles, wherever power must be flexibly transmitted, BLOOD BROTHERS supply job-specified universal joints that "stand the gaff" through countless hours of rugged duty. Before you specify, check with BLOOD BROTHERS for universals that deliver a bonus value.

BLOOD BROTHERS machine co.

A Division of Standard Steel Spring Co.

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a flick of your finger brings you steel . . .

When you need structural steel — of any size and shape — in a hurry, reach for the phone and call International Steel.

International's large stock of structural steel can give you quick service, whatever you need — columns, girders, trusses, or special steel buildings . . . for whatever you are building.

Your best single source of supply is International Steel. Call or write today.

International Steel furnished structural steel for this high, steel open-hearth, shown in construction

INTERNATIONAL STEEL CO. 1803 EDGAR ST., EVANSVILLE, IND.

OBITUARY

Frederick E. Morrow, 69, retired professional engineer, died April 29 at Oak Park, Ill. He had been with the Chicago and Western Indiana R.R. and the Belt Railway of Chicago for 37 years, having retired in October, 1948, as chief engineer.

Robert J. Love, 68, division engineer for the Tennessee Department of Highways and Public Works for the last 30 years, died in Nashville April 28. He was graduated in civil engineering at the University of Tennessee in 1905. For a time Mr. Love worked for the Southern Railway and did some civil engineering work in Mexico and Peru. Returning to the United States in 1914, he served as Monroe County, Tenn., engineer before becoming division engineer.

Everett C. Meyers, 51, city engineer of Maplewood, Mo., died April 26. He was graduated from the University of Wisconsin in 1923 and had been Maplewood's engineer since 1926. He also served as engineer for the communities of Valmeyer and Pleasant Hill, in Illinois, and the Missouri communities of Vinita Park, Crystal City, Winfield, Wentzville, New Haven and Clarksville.

Bagster Roads Seabrook, 85, pioneer British Columbia inventor and engineer, died at Victoria, B. C., April 15. He started his career with Albion Iron Works, the firm which built the first sternwheel steamers to reach Dawson during the 1898 gold rush. He was general manager of the firm for eight years at the turn of the century, and supervised construction of the dome on the legislative buildings at Victoria. He opened his own business in 1903.

Raymond L. Widdiefield, 44, Medina County engineer at Medina, Ohio, and head of the county highway department, died April 24. He was a graduate of Ohio State University.

Everett L. Gardner, 67, one of the builders of Indiana's state park system, died April 23 in Indianapolis. He was long active in conservation work, and in 1925 became conservation commissioner of the state, serving for five years. He was largely responsible for purchase of land for Dunes, Pokagon and Spring Hill state parks.

James C. Hall, 40, superintendent of the public works department at Fayetteville, N. C., died April 28. A

(Continued on page 73)

Tournapulls beat crawler costs *in abrasive sand*

Electric-control C Tournapull loaded 10½ pay yards of sand in less than 1 minute . . . hauled 600' out of loose borrow pit and over fresh fill . . . . averaged a 1250' round trip every 4.5 minutes.

for Haley, Chisholm & Morris Construction Co. on railroad yard expansion . . . . .

Because of its positive power steer, and sure-footed traction, this "C" was assigned to toughest job sections. In spots like this, power-proportioning differential delivers 4 times the power to wheel on firmest footing.

Flotation of big, 21.00 x 25, low-pressure tires . . . plus instant speed selection helped maintain momentum as "C" hauled and spread over soft fill area. Tournapull hauls varied from 300' to 2 miles one way.

To double size of C. & O. Railroad yard at Russell, Kentucky, 1,200,000 yards of sand were moved from water-soaked borrow pits, and filled in new area to bring grade up to existing track level. Hauls averaged a mile one way, mostly over uneven, soft, spongy terrain. Extreme cycles ran up to 4 miles.

Haley, Chisholm and Morris Construction Co., of Charlottesville, Va., worked equipment hard, 10 hours a day, on their section of the contract. Fleet included 6 high-speed Tournapulls. Performance of these LeTourneau rubber-tired rigs in the tough hauling and loose, abrasive sand won high praise from Superintendent L. S. Coleman. Here's the way he put it . . . "I can operate and maintain three Tournapulls for what it costs me to operate and maintain one track-type unit."

Roll on rubber instead of steel

It's easy to see what a steady "grind" like this, in sand, would do to crawler costs. With Tournapulls, there were no expensive moving parts constantly wearing away in the abrasive material. Too, the Tournapulls with their extra flotation and higher speeds on rubber, consistently made more trips per hour . . . moved more yards per unit per day . . . at lowest-net-cost-per-yard.

Check Haley-Chisholm-Morris' Tournapull performance in panel at left . . . then ask your LeTourneau Distributor about extra yardage output and lower costs possible on your dirtmoving. Don't delay . . . investigate these high-speed, rubber-tired Tournapulls . . . NOW!

Tournapull Trademark Reg. U. S. Pat. Off.

LETOURNEAU PEORIA, ILLINOIS — JOB-PROVED Over 6400 Built and Shipped — **TOURNAPULLS**

MORE YARDS PER HOUR WITH RUBBER-TIRED POWER

"QUALITY PLUS" HOIST

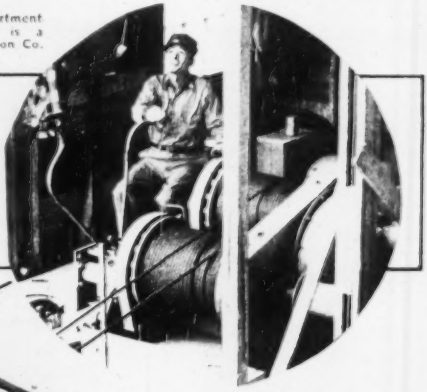
. . . KEEPS A "TIGHT LINE" ON MATERIAL HANDLING COST. For . . .

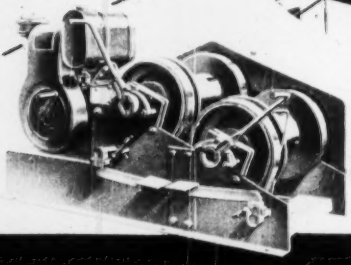
PAUL SMITH CONSTRUCTION COMPANY

THE selection of Clyde for the hoist-handling of all materials on this 210 unit apartment building again attests to the dependable performance of this Clyde "quality-plus" Frame 4 Hoist. The added safety of conveniently located controls and easier operation, lower power requirements due to ball bearing construction, and the honest-to-goodness quality of a Clyde Hoist assure greater productivity per man-hour and the elimination of "down-time" . . . the difference between profit and loss on a project such as this. If you want to stand toe to toe with competition and "stay in the black," it will pay you to drop a line requesting complete information on Clyde "quality-plus" Hoists.

This new 16 story, 210 unit apartment building in Jacksonville, Florida, is a project of the Paul Smith Construction Co.

Here is the two drum, Frame 4, fifty horsepower electric Clyde Hoist in operation on the job. Gasoline or diesel powered units are also available.





CLYDE "QUALITY-PLUS" FRAME 3 HOISTS

One and two drum models of Clyde Frame 3 Hoists have all the quality features of the larger Frame 4 Hoists. This unit is recommended for work where hoisting requirements do not exceed one and one-half ton capacity. Choice of power: gasoline, diesel or electric.

Frame 3-4 ClydeHoists are also made in Canada

CLYDE IRON WORKS, Inc.

Subsidiary of Barium Steel Corp.

DULUTH 1. MINNESOTA

graduate of North Carolina State College engineering school, he was a designing engineer. Formerly he served the Carolina Power and Light Co. for 15 years in Fayetteville, Asheville, and Raleigh, N. C.

Clifford B. Montgomery, 54, chief of the division of contracts and rights of way for the California Department of Public Works, died in Sacramento, April 19.

Oscar C. Blumberg, senior sanitary engineer for the California Department of Public Health, died recently in Berkeley.

Edward G. Scheibley, 70, retired civil engineer, died in Fresno, Calif., April 5.

Melvin C. Rose, 49, chief engineer of the Chesapeake & Potomac Telephone Co., died April 23 at Baltimore, Md. He was a M. I. T. graduate, 1921.

Leroy Hassenstab, 45, assistant engineer of Cass County, Minn., died recently.

Clarence Edward Fisher, 69, an inspector for 55 years for the Washington, D. C., highway department until his retirement in 1940, died May 2. He had attended Georgetown University.

Harry A. Schmitt, 47, village manager and engineer of Shorewood, died April 28. He started as a helper for the village in 1921 and after graduation from Marquette University with a civil engineering degree, he was appointed village engineer during the war, he served in England, Africa and Italy and was discharged with the rank of major.

John P. Oswald, 68, Los Angeles pioneer paving contractor and partner in the firm of Oswald Bros., died April 29. Oswald Bros. paved hundreds of miles of Los Angeles streets since the firm's formation in 1908, including a large portion of Crenshaw Blvd., a major north-south artery. The firm also paved the inner portion of the streets and highways in two Los Angeles suburbs, Inglewood and Hawthorne.

Nicholas Burggraf, 61, an Idaho road contractor for 30 years, died April 27 at Idaho Falls.

Frank Oster, 60, construction engineer and superintendent of the Idaho Fish and Game department for several years, died in Boise, May 1.

CONTRACTORS!

Let BUTLER Steel Buildings Work for You *TWO* Ways...

Butler Buildings like this one can serve you as on-the-job office quarters or as safe storage for equipment, materials.

1 ECONOMICAL TO USE . . .

This Butler Installation for a sanitary commission was sold through a Maryland contractor.

2 PROFITABLE TO RECOMMEND . . .

By specifying fire-safe, weathertight, adaptable Butler Buildings, you can meet your customers' special building needs . . . and you can earn generous commissions for yourself!

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Tear Off and Mail This Coupon TODAY!

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☐ Send information on Butler Steel Buildings for use as job site shelters.

☐ Tell me how I can profit by specifying Butler Buildings to my customers.

Firm Name _____

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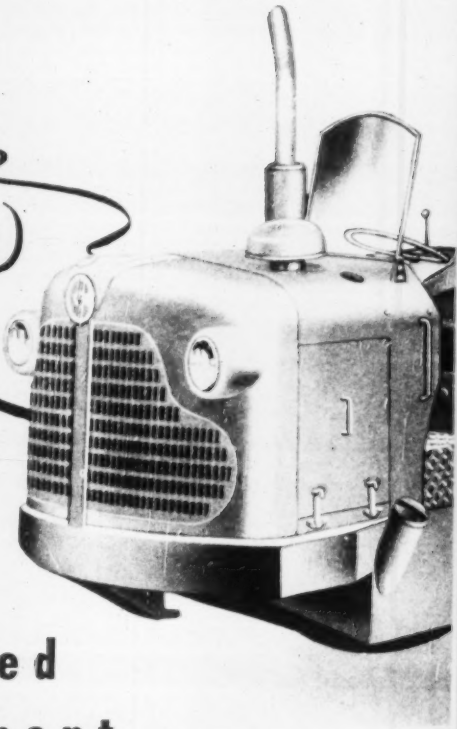
Another addition to

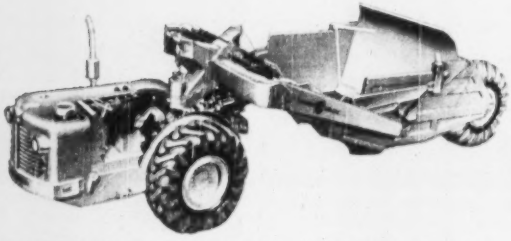
the **NEW**

TW-300

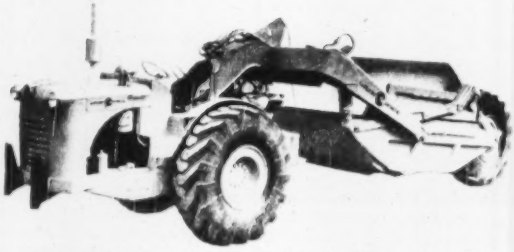
MOTOR WAGON



. . . Joins the LPC Line of High Speed Earthmoving Equipment



MODEL TS-300—A 14 to 17.5 cu. yd. high speed earthmoving powerhouse for the big tough jobs. Fast loading ability cuts seconds off loading time, makes possible an extra trip or two each hour. Positive forced ejection plus high apron lift assures complete ejection of the load on every trip.



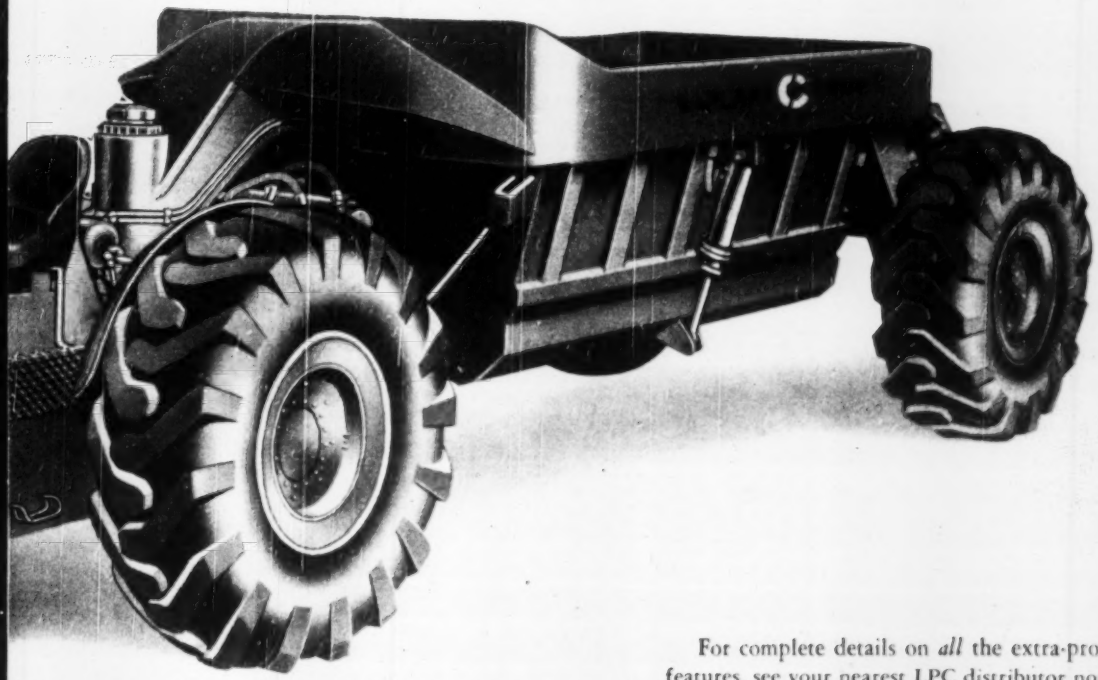
MODEL TS-200—A 9 to 12 cu. yd. hydraulically controlled earthmover that is speedy, agile and powerful. It is small enough for small yardage odd jobs and utility work, yet has all the capacity and speed necessary for those long haul jobs.

LPC Motor Scrapers

LPC 6, 8 and 14 yd. Cable Scrapers

LPC 2 and 4 yd. Hydraulic Scrapers

the LaPLANT-CHOATE FAMILY



HERE'S the new job-tested and job-proved LPC TW-300 Motor Wagon — a hydraulically controlled bottom dump wagon flexibly joined to the same big rubber-tired tractor so popular on the TS-300 Motor Scraper.

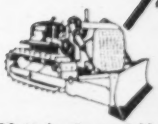
Here again is the successful profit-making combination of big, rugged power (225 H.P.), big capacity (14 yd. struck, 19 heaped), high speed (21.2 MPH). Big 24.00 x 29 24-ply tires to carry the largest loads—Double-acting hydraulic steering and hydraulic door control for easy, effortless operation—Large 4-wheel air brakes, and a host of other features that make this unit outstanding in its field.

For complete details on *all* the extra-profit features, see your nearest LPC distributor now. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa—LaPlant-Choate Sales and Service, 1022 77th Ave., Oakland, Calif.

FAMOUS LaPLANT-CHOATE DOZERS — both angling and straight blade — are again available in either hydraulic or cable-operated types. See your LPC distributor NOW!

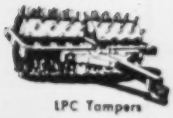
LaPLANT CHOATE

LPC TW-300 Motor Wagons

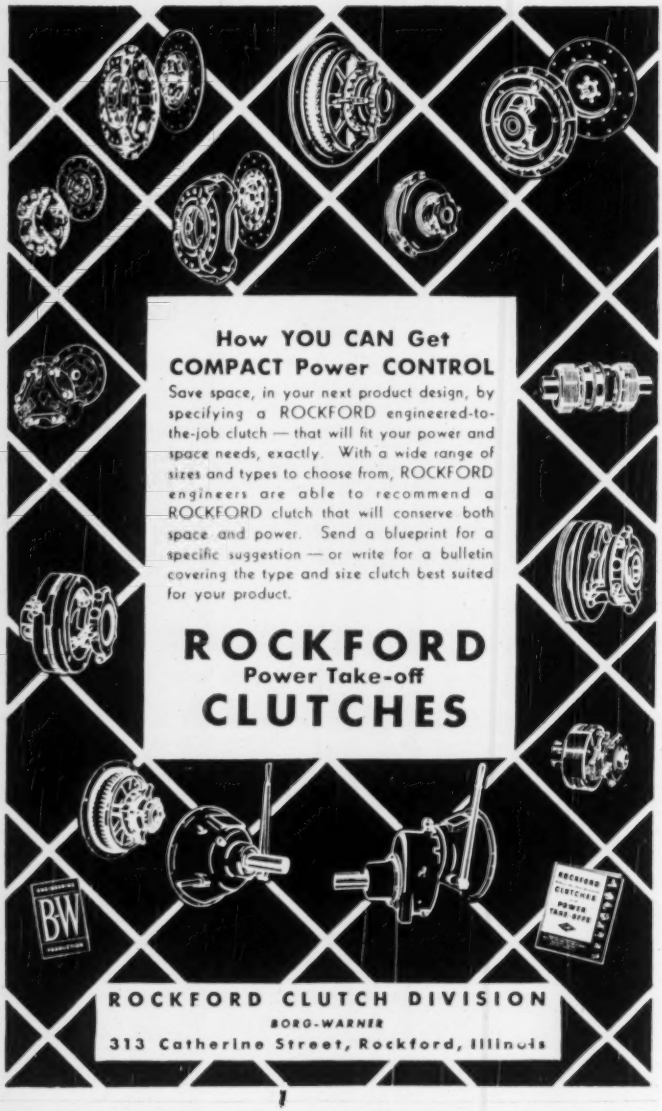


LPC Hydraulic or Cable Operated Dozers

LPC Rippers



LPC Tampers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COMPACT Power CONTROL
Save space, in your next product design, by specifying a ROCKFORD engineered-to-the-job clutch — that will fit your power and space needs, exactly. With a wide range of sizes and types to choose from, ROCKFORD engineers are able to recommend a ROCKFORD clutch that will conserve both space and power. Send a blueprint for a specific suggestion — or write for a bulletin covering the type and size clutch best suited for your product.
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Power Take-off
CLUTCHES
ROCKFORD CLUTCH DIVISION
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Foundation Testing for Bridges, Dams and All Heavy Structures

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See our catalog in Sweet's

ELECTIONS AND ACTIVITIES

The Houston, Tex., chapter of the Associated General Contractors has elected the following officers: Howard T. Tellepsen, president, succeeding Carl A. Schneider; Fred Fischer, vice-president; Loy W. Duddlesten, executive secretary; James B. Dent, treasurer; Warren S. Bellows, Jr., and Fred Fischer, directors.

Thomas R. Camp, of Camp, Dresser & McKee, was elected president at the recent 102nd annual dinner meeting of the Boston, Mass., society of Civil Engineers. Other officers are: vice-president, Emil A. Gramstorff, professor and head of the department of civil engineering Northeastern University; secretary, Robert W. Moir, associate civil engineer Metropolitan District Commission; treasurer, Herman G. Dresser of Camp, Dresser & McKee; directors, William E. Hyland of Fay, Spofford & Thorndike; Allen J. Bundon, Metcalf & Eddy.

Ohio Society of Professional Engineers has elected Prof. George W. Clark, of Ohio University, Athens, as president. Vice-presidents elected were: Edward Drason, Cincinnati; Charles E. Hatch, Toledo, and Raymond Freese, Cleveland. Wallace E. Adams, Middletown, was elected secretary; and Willys G. Stanton, Columbus, treasurer.

Ohio Conservation Congress has elected: Pat Patterson, Cleveland, president; E. L. Hewitt, Dayton, vice-president; Don Spangler, Canton, secretary-treasurer; and Charles Peters, assistant secretary-treasurer.

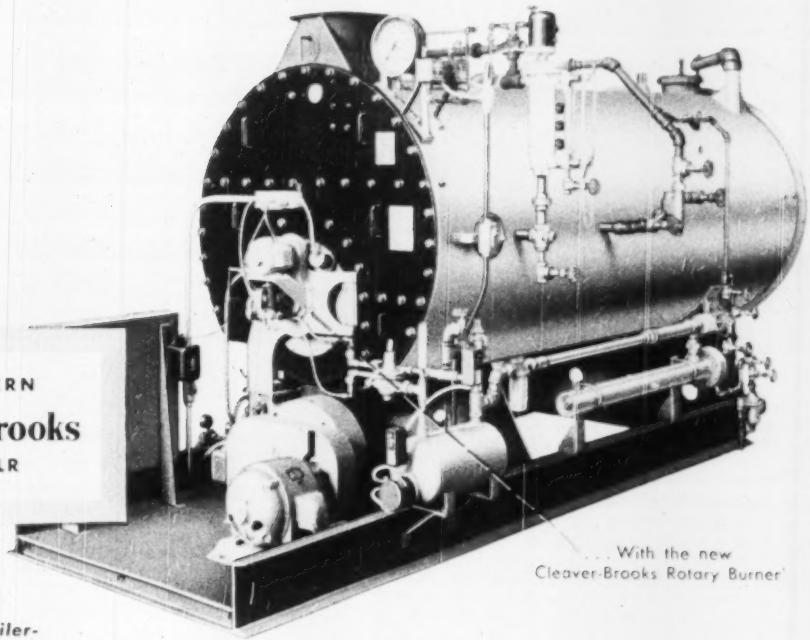
Fresno, Calif., Engineers Club has elected Jack B. McLandle, engineer for Producers Cotton Oil Co., as president for 1950 to succeed Ashton Shields. Other officers: Clement White, vice-president; Joseph S. De Young, secretary-treasurer; and Jess A. Crescini, Charles Buckley, Philip S. Buckingham, and John Armstrong, members of the board.

Connecticut Society of Civil Engineers has elected President, William Bolton, division engineer Bureau of Engineering, New Haven; first vice-president, William Wise, West Hartford; second vice president, Warren M. Creamer, Farmington; director dis

(Continued on page 82)

Design

FOR PRODUCING STEAM



THE MODERN

Cleaver-Brooks

MODEL LR

. . . With the new Cleaver-Brooks Rotary Burner

NOW*— *A Better Boiler-Burner Unit to Utilize Today's Low-Cost Fuels — Heavy Oil and Gas

The Cleaver-Brooks Model LR is a "trail-blazer" in modern self-contained boiler design and construction. It makes more effective use of today's low-cost fuels, (heavy oils and gas), and you are assured of better boiler performance.

A Brief List of Notable Features:

— the new Cleaver-Brooks rotary burner — simple — compact — precision machined — perfect mechanical balance — fully automatic — provides unprecedented flexibility in burning heavy fuel oils or industrial gases.

— single low-speed, low-power consumption blower furnishes both primary and secondary air for combustion—less weight and space requirements — reduction in sound levels.

— totally enclosed, drip and dust-proof panel for all major electrical controls.

— electronic combustion safety devices, dual low water cutoffs — are standard equipment.

— simplified design of combination gas-oil burner permits change-over from oil to gas or vice versa in less than a minute.

— improved design of boiler furnace and liberal heating surfaces provide greatest economy with all fuels.

— boilers of all-welded construction — meet standards of A.S.M.E. boiler code and leading underwriters — burner approved by recognized national agencies.

The Cleaver-Brooks Model LR self-contained boilers are of a highly developed four-pass fire tube design — tested and proved by factory and field experience on several thousand boilers of this type.

Write for complete specifications, dimension data, firing rates.

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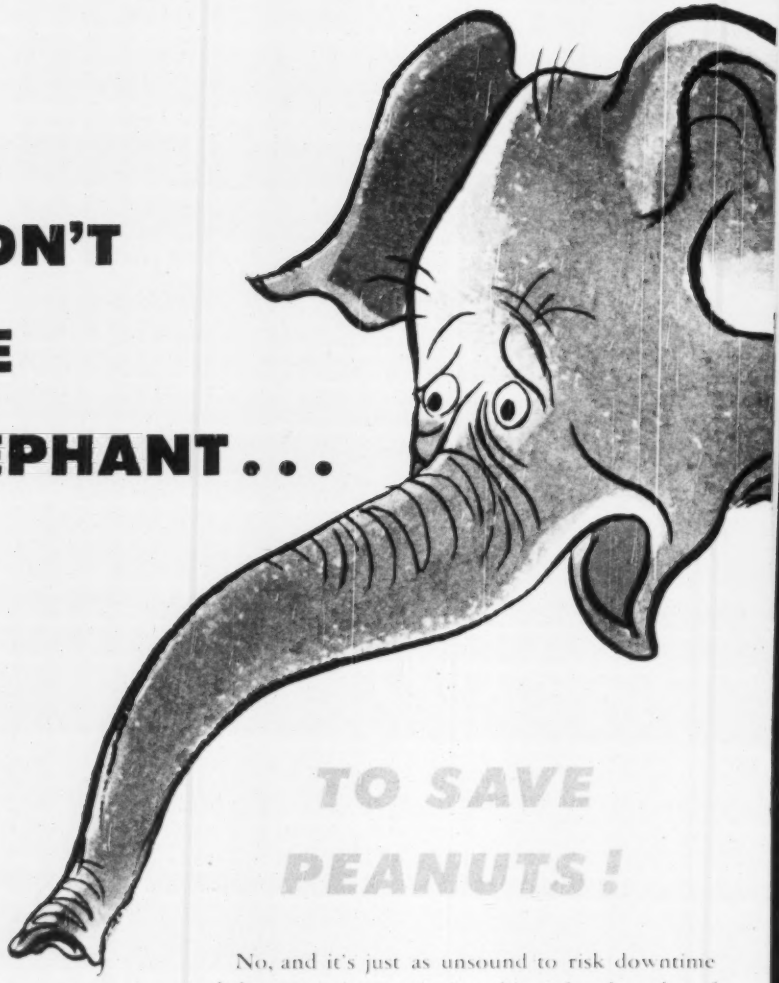
Now Ready: Bulletin SG 142 contains detailed data and description of the MODEL LR. Send for your copy today!

YOU WOULDN'T STARVE AN ELEPHANT . . .



TO SAVE PEANUTS!

No, and it's just as unsound to risk downtime and damage to expensive machines for the sake of saving "peanuts" on lubricant costs! For lubrication is not just "oils and greases"... it's also knowledge of your machines, the right lubricants to use, and where and when to use them.

That's why you save in so many ways with *Socony-Vacuum Correct Lubrication*... a custom-made program of lubrication for your particular equipment and operating conditions that pays off in greater efficiency, faster work-progress, lower maintenance costs, and—ultimately—lower lubrication costs.

For the *genuine* savings of Correct Lubrication, call your Socony-Vacuum Representative.

Here's Practical Help for Contractors . . .

Socony-Vacuum gives you . . .

- Help on all maintenance problems.
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EXCAVATOR

Power and labor are saved on long range excavating by using a Sauerman Cableway or Scraper which combines digging and delivery of material in a continuous process with one operator.

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Specifications, operating data, capacity charts, photos of typical installations of varied types and sizes—all are in the Sauerman Catalog. Write for this free book today.

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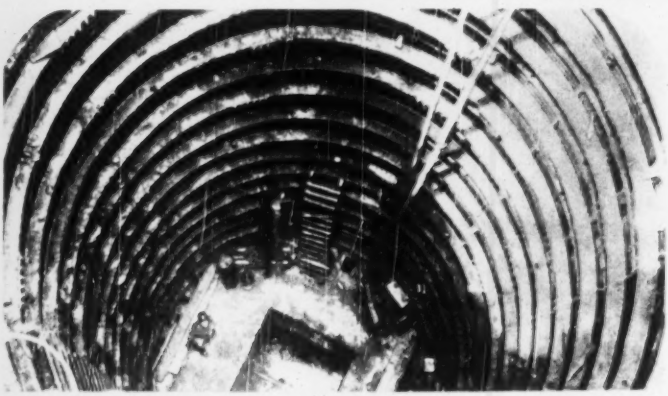

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Commercial Liner Plates will keep you from going into the "hole" because they are constructed for easy—quick—economical installation. They're designed for the individual project and furnished to exact specifications. Consult a COMMERCIAL Engineer on your Tunnel and Shaft requirements.

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trict #1, Burke L. Bigwood, West Hartford, director district #2, Howard S. Ives, Norwich, director district #3, Charles A. Arnold, New Haven, director district #4, James L. Lennon, Bridgeport. At a recent panel discussion of civil engineering prospects, the consensus was: "Prospects are bright because the economic future of the engineering business is good in the construction, industrial and consulting fields."

Carlton S. Proctor, New York consulting engineer, has been elected 1950-51 chairman of the Construction Industry Advisory Council, which is composed of more than 100 national trade and professional organizations with a major interest in construction. Mr. Proctor, who has served as vice president and director of the American Society of Civil Engineers, is a member of the firm of Moran, Proctor, Freeman & Mueser. He has been connected with the design of many buildings, dams, bridges, and other engineering works in North and South America and in Russia.

Guy Morton, of Albuquerque, has been elected president of the New Mexico Society of Professional Engineers. Charles E. Barnhart, of Albuquerque, was elected first vice president, and Lawrence D. Wilson, Santa Fe, second vice president. T. T. Castonguay, of the University of New Mexico engineering department, was re-elected secretary-treasurer.

Alton Skinner, Sr., has been elected president of the Durham, N. C., Engineers Club, succeeding P. D. Davis. Other officers are: M. A. Ham, vice president, and Guy H. Bennett, secretary-treasurer.

MAJOR MEETINGS

American Water Work Associations, annual conference, Convention Hall, Philadelphia, Pa., May 21-26.

Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Cleveland, Ohio, May 25-27.

Building Officials Conference of America, Indianapolis, Ind., June 4-8.

National Society of Professional Engineers, annual meeting, Hotel Statler, Boston, Mass., June 5-10.

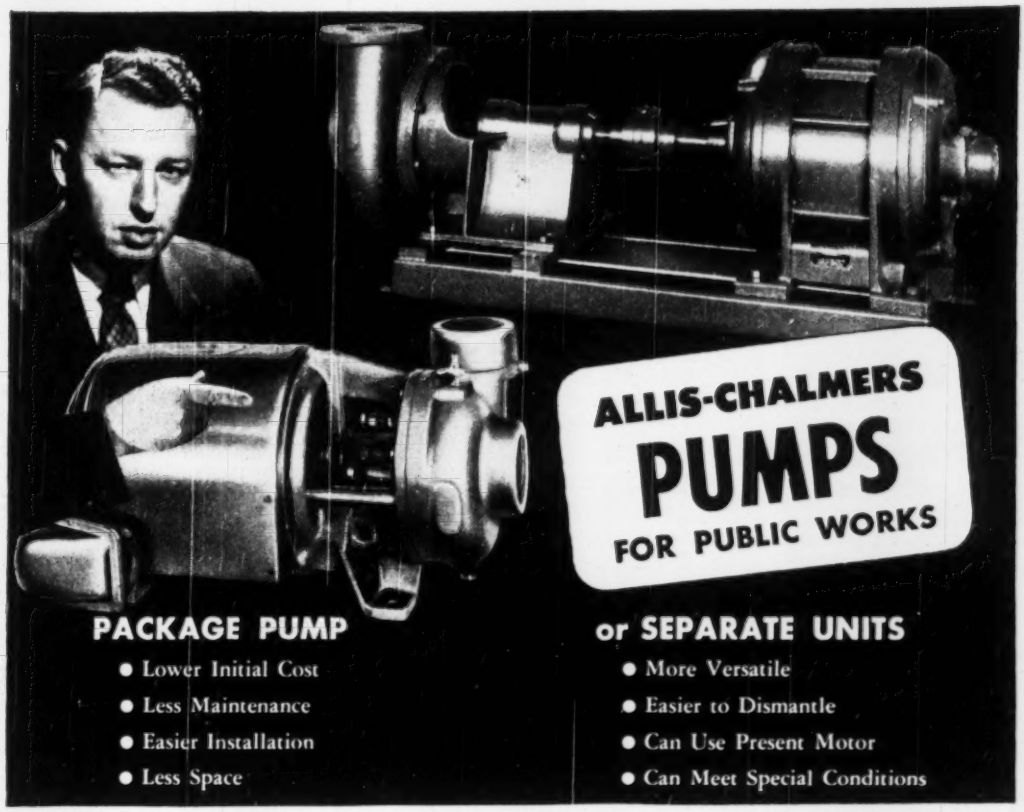
Central States Sewage Works Association, Hotel Lincoln, Indianapolis, Ind., June 9-10.

Western Association of State Highway Officials, Mapes Hotel, Reno, Nev., June 12-15.

Pennsylvania Sewage Works School, State College, Pa., June 19-22.

Pennsylvania Water Works School, State College, Pa., June 26-30.

American Society of Civil Engineers, annual convention, Royal York Hotel, Toronto, Ont., July 12-14.



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WISCONSIN — Both Heiliner Scrapers and Bottom-dump Wagons were used on this airport job. Scraper capacity 18 cu. yds. — Bottom-dump wagon 20 cu. yds.

PENNSYLVANIA — When the going's tough, like it is in the wet, slippery, sticky clay on this road job, you can count on Heiliners to give you faster haul cycles.

ILLINOIS — Keeping "Farm to Market" road costs down with a Heiliner. Note Heil Cable Dozer on tractor.

KANSAS — At Cedar Bluff Dam, dirt moved fast with Heiliners on the job — thanks to plenty of lugging power, high top speed, bonus loading, and passenger car steering.

244 More Pay Yards with a Heiliner

...proof that Heiliners move more dirt, faster--at less cost

● That was the margin of superiority in an exacting competitive test. A contractor, with 2,000,000 yards of heavy, wet clay to move in a hurry, wanted earthmoving results. He arranged a test. The final figures showed that the Heiliner moved 244 more pay yards per shift than competitive units.

Put Heiliners on your job and you, too, will enjoy faster haul cycles, more pay yards, larger profits. Get the complete Heiliner story from your Heil distributor, or write for latest bulletins.

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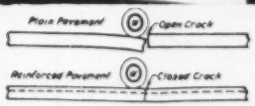
Factories: Milwaukee — Hillside, N. J.
District Offices: Hillside, Washington, D. C., Atlanta, Milwaukee, Detroit, Chicago, Minneapolis, Kansas City, Dallas, Los Angeles, Seattle

NEW JERSEY — The Heiliner's efficient scraper design loads faster, eliminates voids for larger payloads, dumps cleanly and more rapidly at the fill for more round trips.

FLORIDA — Plenty of flotation for fast travelling in this sandy soil. Cable life is longer because cables and sheaves are located outside the bowl away from abrasive material.

Build New Life into old roads

with American Welded Wire Fabric



The large composite picture shows how existing roads can be widened and strengthened by resurfacing with concrete, reinforced from shoulder to shoulder with American Welded Wire Fabric. The small sketches show how Welded Wire Fabric prevents progressive damage by holding cracks tightly closed.

When your old roads prove unable to handle the increased weight and volume of today's traffic, you often can restore them to full service without incurring the excessive cost of replacing the entire road. Many highway engineers have modernized their old roads by surfacing them with concrete reinforced with American Welded Wire Fabric.

Using the old pavement as a foundation, they have built wider roadways to accommodate a greater number of vehicles. The reinforced concrete slabs are stronger — readily withstand the incessant pounding of heavy loads. A new reinforced concrete surface provides better visibility and insures greater safety than other types of resurfacing.

In resurfaced concrete roadways, the many small, closely spaced steel members of American Welded Wire Fabric fortify all parts of the slab against stresses and strains in all directions. The rate of cracking is sharply reduced and such cracks as do occur are held tightly closed, preventing progressive damage to the pavement.

When you are planning to build new life into old roads, our technical staff will be glad to supply complete data on specific designs and standard styles of U·S·S American Welded Wire Fabric that are available. Write to our nearest sales office today, you incur no obligation.

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GENERAL OFFICES: CLEVELAND, OHIO
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Every concrete paving job needs

USS

AMERICAN WELDED WIRE FABRIC

reinforcement

UNITED STATES STEEL

(Continued from page 840)

1949 Book of A.S.T.M. Standards—Part 4—Paint, Naval Stores, Wood, Adhesives, Paper, Shipping Containers. 1,289 pp. American Society for Testing Materials, 1916 Race St., Phila. 3, Pa. $8.00.

Best's Safety Directory—1950-1951—Third Edition. 511 pp. Alfred M. Best Co., 75 Fulton St., New York 7. $5.00.

The Fort Loudoun Project—Technical Report No. 11, Tennessee Valley Authority. 533 pp. Superintendent of Documents, Washington 25, D. C. $2.00.

Stages and Discharges—Mississippi River and its Outlets and Tributaries 1947—301 pp. For sale by the President, Mississippi River Commission, Vicksburg, Miss. $1.00.

Welding Handbook—Third Edition—1651 pp. American Welding Society, 33 W. 39th St., New York 18. $12.00.

Author's Guide for Preparing Manuscript and Handling Proof—80 pp. John Wiley & Sons, Inc., New York; Chapman & Hall, London. $2.00.

Rebellious River—By J. P. Kemper. 27 pp. Bruce Humphries, Boston. $6.00.

Engineering Surveys, Elementary and Applied—By Harry Kulbey, George F. Ward-Lommel, Marion Wesley Todd. 169 pp. Macmillan Co., 60 Fifth Ave., New York. $5.00.

Plane Surveying—By Frank R. Theorin and Lisle A. Smith. 358 pp. Ronald Publishing Corp., New York, Toronto, London. $3.50.

Plane Trigonometry—By H. M. Dadourian. 84 pp. Addison-Wesley Press, Cambridge 42, Mass. $3.50.

Handbook of Aerial Mapping and Photogrammetry—By I. C. Tiron. 178 pp. Cambridge University Press, London and 51 Madison Ave., New York 10. $5.00.

An Index of Nomograms—By Douglas P. Adams. 174 pp. The Technology Press, Cambridge, Mass.; John Wiley & Sons, New York 16; Chapman & Hall, London. $14.00.

Reports and Pamphlets

Highway Statistics 1948—U. S. Dept. of Commerce, Bureau of Public Roads, obtainable from the Superintendent of Documents, Washington 25, D. C. 65¢.

An Electrical Method for Measuring Air Concentration in Flowing Air-Water Mixtures—By Owen P. Lamb and John M. Killen. Technical Paper No. 2, Series B, St. Anthony Falls Hy.

(Continued on page 95)

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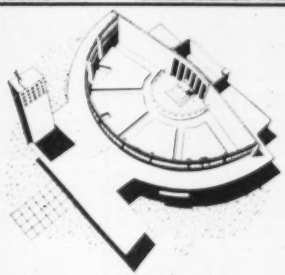


Church of Christ The King, Seattle—a striking departure from traditional treatment. Curved walls were formed with 4'x8' ⅜" plywood, nailed horizontally to 2"x12" wales, band-sawed to desired radius. Wales were placed together, 24" to 30" o.c. In no place were they sawn to less than 3 inches. Double wales were backed with 2"x4" studs, 12" o.c. The Austin Company, Seattle, were the builders.

"Plywood Offered Best Solution to Form Problems,"

Says Seattle Architect Paul Thiry

Concrete surfaces for this Seattle, Washington, church had to be smoothly curved to carry out the simple dignity of the design. Architect Paul Thiry specified Douglas fir plywood forms.

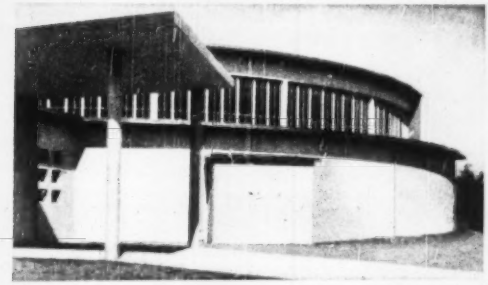
"The panel material," he says, "offered a simple and most economical solution to the twin problems of smooth concrete and curved structure. Plywood is easy to use. It produces smoother surfaces with a minimum of finishing and is readily bent to the desired radius."

On small jobs and large, Douglas fir plywood has proved its ability to do the unusual and the difficult in form work. Employ its advantages to the fullest!

Douglas Fir Plywood

AMERICA'S

Smooth, Curved Surfaces Easily Achieved with Plywood



Douglas fir plywood forms were easily bent to produce the smooth curve of the outer walls. Canopy over the main entrance and the bell tower were also formed against ⅜" plywood. Concrete bands above and below the clerestory windows were formed with ¼" plywood, backed by bandsawed 2"x12" wales and 2"x4" studs.

The half-circle shape of the structure affords a fan-shaped seating arrangement which brings the entire congregation close to the altar. Reinforced concrete construction eliminates the need for supporting columns which block vision.

Large, Light, Strong *Real Wood* Panels

For additional data on Douglas fir plywood for concrete form work, see Sweet's File, Architectural, or write (USA only) Douglas Fir Plywood Association, Tacoma 2, Washington. Of particular interest are two booklets: "Concrete Forms of Douglas Fir Plywood" and "Handling PlyForm."

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For Smooth, Fin-Free Concrete Surfaces...

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Concrete Form Panels

Smooth, fin-free surfaces . . . ease of handling . . . strength, rigidity, tightness . . . superior nail holding qualities . . . cost-cutting re-use factors—these are primary advantages of PlyForm. Highly moisture-resistant glues used in PlyForm panels permit multiple re-use (as many as 10 to 15 are not unusual). For the greatest possible panel re-use, however, specify Exterior-type Concrete Form grade of Douglas fir plywood—bonded with completely waterproof phenolic resin adhesive. For special architectural concrete, requiring the finest possible finish, the architect or contractor may specify Exterior-type or Interior-type Douglas fir plywood in grades having "A" face veneer—or one of the new plastic-surfaced panels.

Yours for $1

New Keely PlyForm calculator gives construction data for plywood forms, based on hourly rate of pour. Complete with leaflet, "Design Assumptions for New Keely Calculator." Send coupon now!

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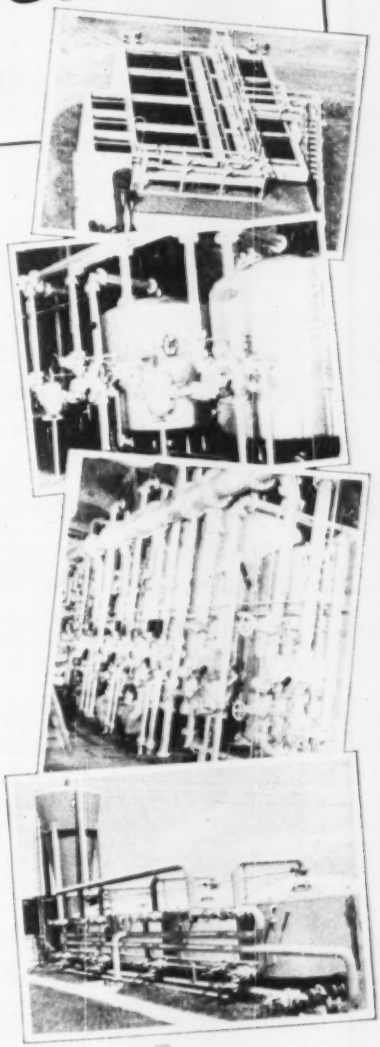

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The ion exchange (zeolite) process for softening or demineralizing water—recognized as the simplest method—was originated by Permutit. Present-day equipment includes fully automatic units with simplified controls, and manually controlled multiport valves, both giving improved performance. Permutit can furnish the correct ion exchanger for any requirements.

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REVOLUTIONARY NEW FIBRE FOR ROTARY POWER SWEEPERS

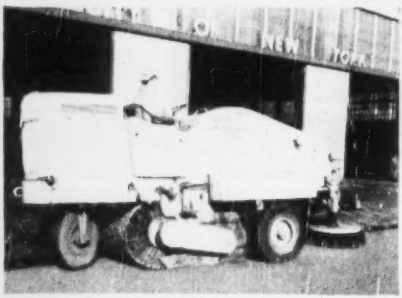
...makes all other fibre obsolete!

PERMENE *fibre developed by Modglin after 3 years research, outwears other fibre many times.*

Permene, the only fibre ever engineered specifically for rotary sweeper use, is the toughest, most durable, most efficient fibre in the world for its purpose.

WEARS LONGER: Street tests by numerous cities, including Los Angeles, New York, Chicago, Glendale, Inglewood, and many others, have shown without exception that Permene outwears any other fibre *many times over.*

CUTS COSTS: Because Modglin Permene wears longer, expensive, frequent re-winding of brooms is eliminated. One city, by switching to Permene, cut the number of re-winding operations per sweeper from an average of 50 times per year to 12. Permene saves labor, saves cost of materials, saves tie-up of equipment.



The new Modglin Permene Fibre now being tested by New York City Department of Sanitation.

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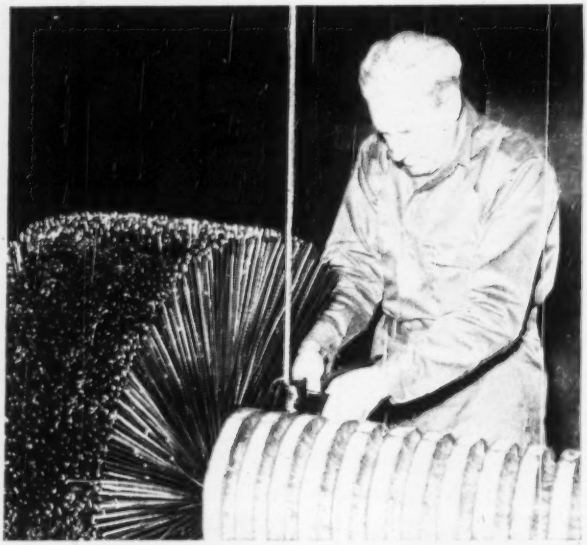

MAKE YOUR OWN TEST: Try Modglin Permene on your own equipment and then you be the judge. *Write us on your letterhead and we will make arrangements through your local distributor.* We want you to see for yourself how uneconomical it has become to sweep with any fibre but Permene! *Write us for particulars today.*

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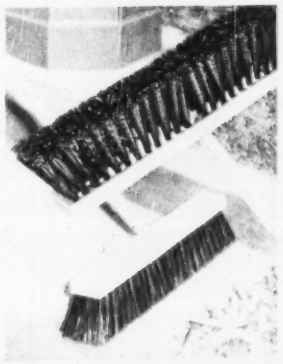
The #321 Perma Push is the most efficient and long wearing push broom ever built for street use. Its extremely durable Permene® fibre is resistant to common petroleum products, cleaning solutions and to water. Fibre never gets soggy, water logged or soft. It retains its flicking action at all times. With a capacity of 10 cubic feet, this 24" broom will sweep up to 3 times as much as any other push broom. Its 24" fibre length gives it a long sweeping life. Write for detailed information today.



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Hugh D. Reich, Contractor Reports:

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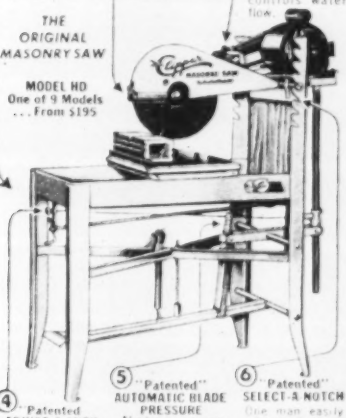

(4) "Patented" ADJUST-A-CUT" — Merely pull knob and Cutting Head is free for finger-tip setting to desired angle. Release knob and Head Locks in desired position.

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UNIT PRICES BID BY CONTRACTORS

Airport lighting, Kansas

The successful bidder, Salt City Electric Co., Hutchinson, Kan., on the Salina Municipal Airport marking and lighting was low because of an exceptionally low quotation on the illuminated wind cone and the transformer vault. Nine contractors submitted bids. The four low bids were only 5% apart, but the high bid was 27% above the low $26,359.20. Wilson & Company, Salina, are engineers.

Work must be completed in 60 working days. Wages to be paid are for unskilled laborers, $1.00; power equipment operators, $1.00-$2.00; electricians, $2.00.

Bidders include:

1 Salt City Elec. Co., Hutchinson, Kan. (contract)	$26,359.20
2 Gen. Air Conditioning & Elec. Co., Salina, Kan.	27,463.58
3 Hill Elec. Co., Wichita, Kan.	35,847.60

Items	Quantity	Unit prices 1 cent	2
21-ft beacon tower	ea	1	$1,600 $1,600
36" rotating beacon	ea	1	2,947 1,901
Wind cone, illum.	ea	1	360.00 652.00
Mrkr. segmtd. circ.	ea	24	83.00 66.20
Transformer vault	ea	1	3,529 [illegible]
Control cabinet	ea	1	647.00 383.00
Runway mrkr. lights			
Clear	ea	16	145.00 142.31
Clear, A. yellow	ea	32	148.00 143.56
Green	ea	12	148.00 129.33
Trenching & backfill			
18" min. depth	lf	12,500	0.154 0.16
24" min. depth	lf	100	0.20 0.16
Underg. cable			
1 cd., 5,000 v.			
No. 8 awg	lf	11,600	0.135 0.13
2 cd., 600 v.			
No. 10 awg	lf	300	0.11 0.147
No. 8 awg	lf	1,200	0.21 0.233
3 cd., 600 v.			
No. 4 awg	lf	150	0.63 0.506
No. 6 awg	lf	60	1.20 1.00
12 cd., 600 v.			
No. 12 awg	lf	150	0.47 0.853
3 cd., 5,000 v.			
No. 8 awg	lf	80	0.38 1.24
Mrkr., underg. cbl.	ea	10	9.50 10.00

cd-conductor; awg-Amer. wire gauge

Earthwork and structures on Fire Mountain Canal, Colo.

Only one bid, $137,887 by Crocker and Ellett, Inc., Denver, of the six submitted on Feb. 10 was below the engineer's estimate on earthwork and structures for this enlargement of about 6.7 miles of Fire Mountain Canal, Poudre Project, Colo. High bid at $216,607.50 was 57% above the low.

The Bureau of Reclamation work consists of removing existing timber bridges, concrete turnouts, flumes, checks, wasteways and excavating earthwork and construction for reinforced concrete culverts, siphons and wasteways; excavation and earthwork for enlargement of 6.7 miles of canal in earth section, placing approximately 0.5 mile of earth lining in canal; reconstruction of structures and replacing road crossings.

Pipe for handrails, stop-plank guides, earthwork, metal Parshall flumes, including gages, screw-lift vertical gates, gate frames and hoists will be furnished by the government.

The contractor was to begin work within 30 days after receiving notice and must complete the job in 15 months. No work can be done within existing canal, or adjacent to it, that would interfere with the flow of irrigation water from Apr. 15 to Oct. 15.

Wage rates prevailing are: unskilled laborers, $1.20 per hour; pipe layers, $1.40-1.70; power equipment operators, $1.45-2.15; truck drivers $1.40-1.60.

1 Crocker & Ellett, Inc., Denver, Colo. (contract)	$137,887
2 Young & Smith Constr. Co., Salt Lake City, Utah	151,301
3 Schmidt Constr. Co., Grand Junction, Colo.	216,607
Engineer's estimate	146,346

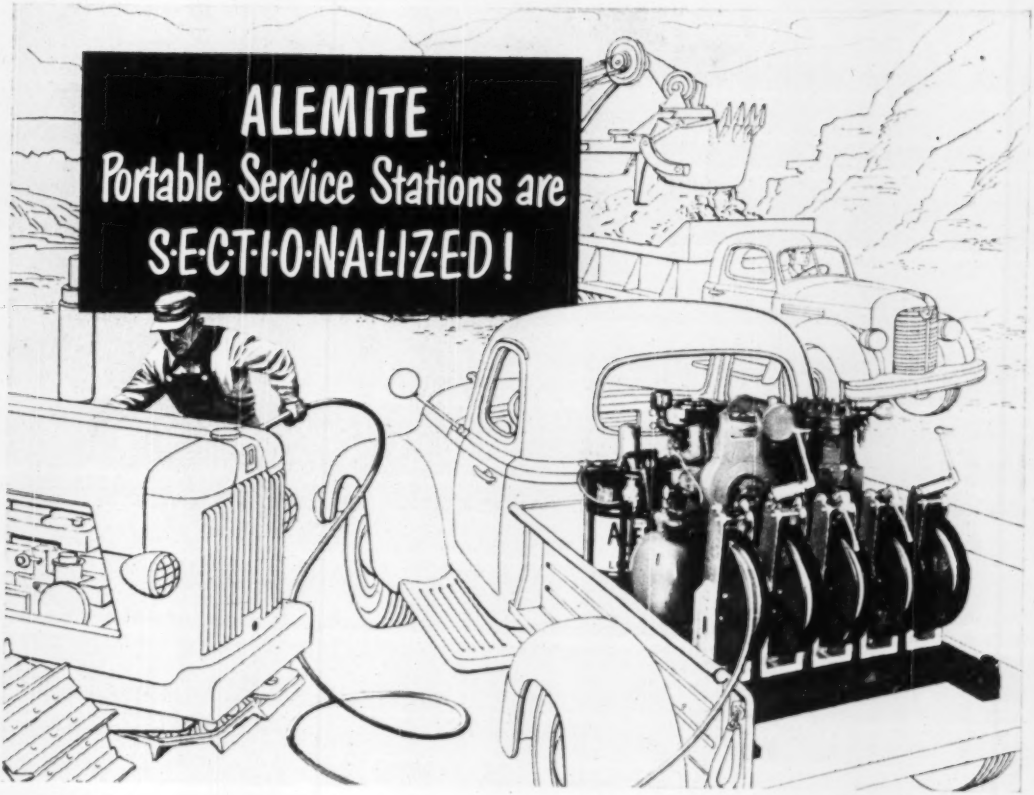
Item	Quantity	Unit prices 1 cent	2
Remov. exist. struct.	ls	$1,000	$1,500
Com. excav., canal	cy	130,000	46 60
Rock excav., canal	cy	6,300	1.50 60
Overhead	cy	11,000	.65 .615
Compact embankm.	cy	4,000	.70 .40
Reloc. & constr. farm ditches	lf	1,000	.25 .60
Riprap	cy	250	7.00 8.00
Com. excav., struct.	cy	3,000	1.50 2.50
Rock excav., struct.	cy	150	1.50 2.50
Backfill	cy	1,750	1.00 1.00
Compact backfill	cy	800	2.50 6.00
Place earth lining	ea	1,500	1.50 2.50
Dry rock pav.	sy	50	5.00 6.00
Concr. in struct.	cy	350	90.00 80.00
Conc. bars & fitgs.	lbs	5,000	.06 .06
Bend bars, furn. pl.	lbs	34,000	.15 .15
Farm & lat. pipe			
6" diam. conc.	lf	150	2.50 1.60
12" diam.	lf	120	4.00 2.50
18" diam.	lf	110	6.50 5.00
2" galv. steel	lf	200	2.00 1.00
Metal Parshall flumes			
6" assmbl. & inst.	ea	11	25.00 20.00
9" assmbl. & inst.	ea	12	35.00 25.00
12" assmbl. & inst.	ea	4	50.00 35.00
Farm A erect. outreat. timber in struct.	Mbm	20 & 240	100.00 300.00
Farm A erect. treated timber in struct.	Mbm	3.7	300.00 350.00
Inst. screw lift gts.	lbs	4,000	.25 .20
Inst. misc. metalwk.	lbs	1,000	.10 .35

Olympus siphon, Colo.

Nine bids were received by Bu. of Reclamation Jan. 19 for Olympus siphon and access road, Estes Park-Foothills Power Aqueduct, Colorado-Big Thompson Project, near Loveland, Colo. Completion time, 245 days. All gravel and cement furnished by government.

1 Peter Kiewit Sons' Co., Omaha	$124,925
2 Electrical Contractors, Inc., Ogden, Utah	125,102
3 Gaughen Const. Co., Glenwood Springs, Colo.	141,123

Item	Quantity	Unit Prices 1 cent	2
Excav. com. struct.	cy	11,500	$1.00 $1.00
Excav. rock, struct.	cy	20,000	1.00 2.60
Backfill	cy	20,500	.60 .40
Compact backfill	cy	3,850	1.00 3.50
Concrete in struct.	cy	1,100	1.00 3.00
Riprap	cy	500	1.00 4.00
Haul rock to riprap	cy	1,250	2.00 1.60
Concr. in struct.	cy	1,500	35.00 31.00
Bend bars, f.a.p.	lb	600,000	.03 .10
Mill safety steps, f.a.p.	lb	21,900	.25 .20
Inst. all A steel pipe, incl. elbows, f.a.f.	lb	26,000	.20 .20
Conc. reinforced, f.a.f.			
30"	lf	52	7.00 5.60
36"	lf	45	9.00 6.50
42"	lf	186	15.00 8.90
Cubic concrete yards, f.a.f.	lf	100	1.00 1.00
Barbed fence, f.a.f.	mi	0.5	2,000 1,000
Mill bars, f.a.f.	cy	2	60.00 10.00



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Alemite Hose Reels for high and low pressure delivery of chassis grease, gear oil, engine oil, air and water. Available in single or multiple units to suit every need.

CONSTRUCTION REPORTS

Bids Asked—Low Bidders—Contracts Awarded

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ELSIE EAVES, Manager *J. A. MAHONEY, Reports* *M. R. ROESSLER, Statistics*

WATER SUPPLY

BIDS ASKED

Que. Sillery—B.A. 5/22 ... Mayor ... Ave. ... filtration ... finishing and chemical ... Engr. CD

O. Dayton—B.A. 5/23 ... Montgomery Co. ... water ... Ave. ... Dayton ... Engr. CD

Va. Bristol—B.A. 5/24 ... City Manager ... water ... Engr. CD

Ont. Toronto—B.A. 5/23 ... Bldg. District ... water works ... party.

Conn. Hartford—B.A. ... Water ... Dist. ... Bldg. ... Ave. ... Engr. ... Engr. CD

Mich. Lansing—B.A. 5/26 ... State Hy. Dept. ... Bldg. ... Engr. ... Detroit ... Engr. CD

Tex. Sweetwater—B.A. ... City ... Sweetwater ... Dam for ... Engr. ... Ft. Worth ... CD 4-3-49

Tex. Pleasanton—B.A. 5/26 ... City ... water main ... Engr. ... Ave. ... engr. CD 4-2

Tex. Waxahachie—B.A. 5/24 ... City ... SW ... Engr. ... Ave. ... CD 4-27

† N. M. Gallup—B.A. ... U. S. Engr. ... Albuquerque ... Water Works ... Wayside ... Engr. ... Ave. ... CD

LOW BIDDERS

▲ Pa. Allentown ... $1,071,660 ... $129,799 ...

Wash. Tacoma ... $73,368 ...

CONTRACTS AWARDED

Ind. Jeffersonville ... Approx. $400,000 ...

Wis. Watertown ... $47,500 ... Bids 4-27.

SEWERS, WASTE DISPOSAL

BIDS ASKED

La. Lafayette—B.A. ...

O. Dayton—B.A. ...

Ind. Speedway ...

Mich. Detroit—B.A. ...

Tex. Pleasanton—B.A. ... Engr. ... Ave. ... Engr. ... Ave. ... CD

Sask. Wilkie—B.A. 6/26—P. A. Swanson, town clerk ... Work ... Engr. ... CD

Ark. Gravette—B.A. After 6/27—City ... Engr. ... Fayetteville ... Engr.

Kan. McCracken—B.A. ... Engr. ... Ft. Scott ... Engr. ... Ave. ... Engr. ... CD

Tex. Dickinson—B.A. ... Galveston County Water ... Engrs., Inc., ... Engr. ... Ave. ... Engr. ... CD

Tex. Waxahachie—B.A. 5/24—City ... Engr. ... Ave. ... CD 4-27

Tex. Houston—B.A. ... Engr. ... Ave. ... Engr. ... Ave. ... CD 4-28

LOW BIDDERS

Tex. Austin—City ... Engr. ... Ave. ... CD 4-21

CONTRACTS AWARDED

Tex. Cleveland—City ... Approx. $60,000

Wis. Milwaukee—Drainage ... Engr. ... Ave. ... Bids 4-25, awarded 4-26. CD 4-19

Que. Les Cedres—Municipality ... Contr. ... $52,000. Lalonde & Adam, ... Engr.

BRIDGES

BIDS ASKED

Colorado—B.A. ... Engr. ...

PROJECTS COVERED

Projects—By Size

Construction projects here reported cover the United States and Canada (and in some instances outside) at or above minimum sizes or larger: water supply, earthwork, waterways $20,000; other public works $50,000; industrial buildings $68,000; other buildings $100,000.

Classes of Construction

(Name in order of listing)

Water Supply — Latin America
Sewers, Waste Disposal — Power Buildings
Bridges — Commercial Buildings
Streets & Roads — Industrial Buildings
Railroads (Subways) — Unclassified

Stages Reported

Bids Asked (new projects only) ... For full ... Low Bidders ... value all ... Reports published ... where award is not ... case a supple- ... is published. ... Contracts Awarded ... to low bid- ... a later stage. ... previous ... report was published.

Symbols and Abbreviations Include:

\+ ...
▲ ... $1,000,000 or over
B.A. Bids Asked
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

† Colorado—B.A. 5/23—U. S. Forest Service, P.O. Box ... Denver ... Engr. ... Ave. ... Engr. ... CD

O. Akron—B.A. About June ... Ave. ... Engr. ... Ave. ... Engr.

† Oregon and Washington—B.A. ... Engr. ... U. Bureau of ... Work ... Engr. ... Ave. ... Engr. ... CD 4-28

LOW BIDDERS

Alabama—State Hy. Dept., Montgomery, Apr. 28, bridge ... Jefferson ... $73,662 ... $64,460 ... $57,948 ... CD 4-24

Colorado—State Hy. Dept., Denver, Apr. 21, ... Platte River ... $427,222 ... CD 4-13

Delaware—State Hy. Dept., Dover, Apr. 26, ... Henry G. Estebrook & Son, Newark, $209,216, steel- ... New Castle Ave. overpass, Fed. Aid Proj. F 38 (1), ... New Castle Co., from Dupont & Stanton ... Penn. RR to Schuylkill Ave., Phila., Pa., $426,490 ... CD 4-5

Kentucky—State Hy. Dept., Frankfort, Apr. 28, underpass ... N.N.R. and truck road approaches, 0.018 mi., The Lexington Cycle Co., Inc., low, $48,211; S.P. 54-104, Fayette Co., from Robert H. King Constr. Co., Danville, Ind., $75,628. CD 4-12

Nebraska—State Dept. Roads & Irrigation, Lincoln, Apr. 27, subbase, subgrade, stone ... Fed. Aid Proj. F 241 (1), Nance-Keefer Bridge Co., Inc., ... Omaha Natl. Bank, Omaha, $84,058. CD 4-19

▲ New Jersey—New Jersey Turnpike Auth., 60 Prospect ... Trenton, May 4, County 20, Raritan River bridge ... Contract 4, the Lindenwold ... $1,140,145 ...

CONTRACTS AWARDED

▲ New Jersey—New Jersey Turnpike Auth., 60 Prospect ... Trenton, May 4, County 20, Raritan River bridge ... Contract 4, the Lindenwold ... New York, N.Y., $1,603,740 ...

North Carolina—State Hy. & Pub. Works Comm., ... bridge over Alligator River, Tyrrell Co., ... Contract 1, Dare Co., from Manns Harbor ... $537,636. Wyatt A. Lee & Son, ...

STREETS AND ROADS

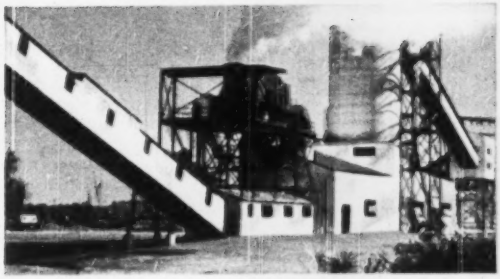
BIDS ASKED

+ Nevada—B.A. ...

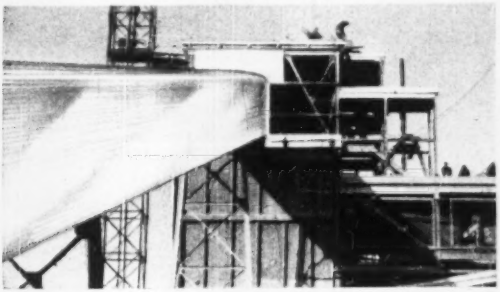
Florida—CB ...

New York—B.A. ... Engr. ... Ave. ... Engr. ... Ave. ... Engr. ... Ave

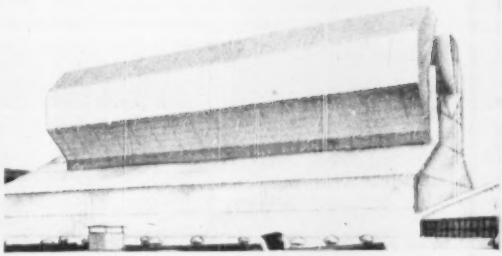
The Superior Roofing and Siding for all Industrial Building...



MINING—Noralyn Phosphate Mine, Bartow, Fla. International Minerals and Chemicals Corp.



POWER—Worcester County Electric Company, Worcester, Mass. New England Electric System.



MANUFACTURING—Forming Department of Anchor-Hocking Glass Corporation plant, Salem, N. J.

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Superior for overall economy, great strength combined with light weight, high insulating value and modern appearance. Low material cost; low application cost; *lowest* maintenance cost—rustproof, needs no painting. Four-foot purlin spacing supports 80 p.s.f. uniform load; yet this aluminum weighs only 56 lbs. per square. And it reflects up to 95% of radiant heat, keeping interiors cooler in summer, reducing winter fuel costs.

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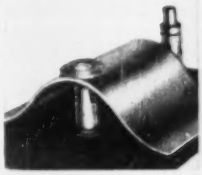
For technical assistance, call any Reynolds Office, in 32 principal cities, or **Reynolds Metals Company**, Building Products Section, 2007 So. 9th St., Louisville 1, Ky.

NELSON "RIVWELD" STUDS cut application costs!

Contractors report up to 50% savings on application with this direct fastening, from above. No scaffolding, no inside work. Cross-section, shows cadmium plated flux-filled base, aluminum insert, aluminum washer placed before riveting. Reynolds can supply these studs!



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REYNOLDS *Lifetime* ALUMINUM INDUSTRIAL GUTTERS

6" Half-Round Gutters, stipple-embossed, with 4" Downspouts to drain 2,000 sq. ft. of roof area per pipe. Slip-joint installation, no soldering. Half the price of other rustproof materials!

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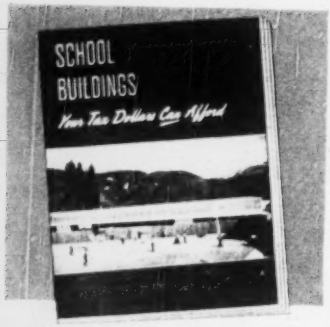
Firm Name

Name

Address

REYNOLDS ALUMINUM



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(Continued from page 96)

CONTRACTS AWARDED

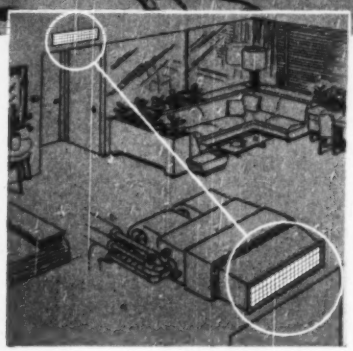
EARTHWORK & WATERWAYS

BIDS ASKED

TO BE TRULY MODERN A BUILDING MUST BE AIR CONDITIONED

Chrysler Airtemp air conditions the Shore Club Hotel

Architect: Albert Anis. Builder: 1901 Collins Corp., Irving Kipnis, President. General Contractor: Robert L. Turchin



Chrysler Airtemp Individual Room Units in the Shore Club Hotel are placed within the entrance ceiling with only the controls mounted on the wall.

INDIVIDUAL ROOM UNIT SYSTEM GIVES GUESTS CUSTOM CLIMATE

The new, ultra-modern Shore Club Hotel, at Miami Beach, offers a new degree of luxury and comfort for its guests. Each of the 150 rooms—as well as all public areas—have individually controlled units—for both heating and cooling. Fresh outside air is filtered and dehumidified for continuous circulation through this system. Chrysler Airtemp equipment was selected for this automatic control of indoor weather.

Here is another instance where Chrysler Airtemp has cooperated with architects, builders and contractors to give their clients the finest in air conditioning. Through regional offices and dealers in principal cities—Chrysler Airtemp offers trained engineers to aid you with any heating or cooling operation—from the initial plans to the final installation.

When desired, Airtemp Construction Corporation—wholly owned subsidiary of Chrysler Corporation—will assume complete responsibility for all or any part of your air conditioning project. You'll find additional information on Chrysler Airtemp service and products interesting—and rewarding. Mail coupon today for full details.

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Division of Chrysler Corporation

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3 BASIC SYSTEMS TO MEET EVERY AIR CONDITIONING NEED—

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LEADING TECHNICAL PUBLICATION ANALYZES WHY GURLEY ALUMINUM TRANSITS ARE ACCURATE, STRONG, LIGHT, VIBRATION-FREE

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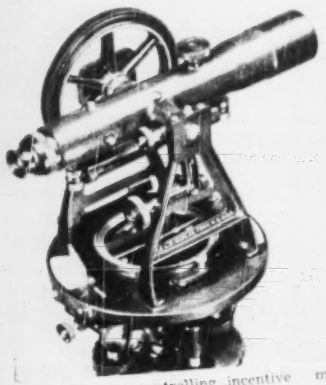

Gurley Instruments

An article describing the advantages of aluminum construction of Gurley instruments where accuracy, strength, lightness and freedom from vibration are essential.

Probably the controlling incentive in the application of aluminum alloys to surveying instrument construction has been the prospect of weight reduction. Consider the labor to be saved by a surveying party which has to carry these instruments about, day after day, often over rough country, when the weight can be reduced by at least one-third.

A comparison of the mechanical properties of the aluminum alloys with those of the other non-ferrous alloys commonly used in the making of surveying instruments is greatly in favor of the light weight metal. The remarkable feature of these strong aluminum alloys is their high yield point in relation to their ultimate strength, especially those in the fully heat treated condition. They are also very rigid and hard.

Some aluminum alloys are suitable for die-casting. Special bearing metals can be inserted in the molds and cast integral with the structural parts. In no other way have bearing metals and structural metals been so effectively and economically combined. A further result of the use of aluminum alloys through this method of manufacture is a decrease in the number of parts. Minor assemblies have been combined into single parts, permitting more accurate manufacture and insuring a permanence of adjustment of these parts in service. The latter feature is doubly true, since the aluminum alloys differ from other materials of instrument construction in that they do not "grow" nor distort with age.

The non-corrosive and non-tarnishing qualities of aluminum furnish added inducements to their application in the construction of precision instruments. This has led to their substitution for silver on accurately graduated circles and verniers. Burnished aluminum does not blacken when in contact with sulfurous gases frequently found in the atmosphere of mines and industrial districts.

Tests with transits made from aluminum alloys have shown not only greater structural strength and durability, but greater stability under conditions which induce vibration. That this should be so is readily apparent, since the light weight greatly reduces the momentum of the instrument and consequently the amplitude of vibration.

Gurley transits constructed of the light alloy metals have been used on all kinds of work, meeting successfully the requirements of durability where Transits receive exceedingly rough handling; permanence of adjustment where they are transported over rough roads; a high degree of accuracy where the work is such as to require especially fine graduations; and economy where serious accidents occur which necessitate repairs. Taken all together Gurley's experience with aluminum, covering a period of over 74 years, has been entirely satisfactory and their use of these modern materials is becoming more and more appreciated by the field engineers.

Gurley Transits are guaranteed because: they are engineered and manufactured to exacting standards; all parts are made in the Gurley plant (including all optical components); they are the products of continuous instrument research for more than 104 years.

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GURLEY

Surveying and Scientific Instrument Makers
Since 1845

(Continued from page 98)

LOW BIDDERS

CONTRACTS AWARDED

AIRPORTS

BIDS ASKED

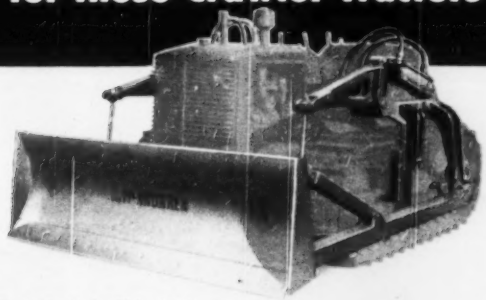
LOW BIDDERS

PUBLIC BUILDINGS

BIDS ASKED

KAY-BRUNNER

Builds Bulldozers and Trailbuilders for these Crawler Tractors:



CATERPILLAR D-2, D-4, D-6, D-7, D-8

INTERNATIONAL TD-6, TD-9, TD-14, TD-18

ALLIS-CHALMERS HD-5, HD-7, HD-10

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Above—Cable control mounting on K-B Bulldozer. **Below**—Hydraulic control mounting on K-B Trailbuilder.

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† Alaska, Petersburg—EXPERIMENT STATION—B.A. 6/6—Agricultural Research Admin. Dpt. Agriculture, 14 St. and Independence Ave. N. W. Wash., D. C. Resident Engr. Experiment Station, U. S. D. A. No. 72-50. Plans depos. $5.

† W. Va., Charleston—ARMORY—B.A. 6/8—U. S. Eng. 63 W. Broadway, Louisville 2, Ky. 2 story, brick, 103 x 162 ft. and 26-ft. high with 50-ft. clear frame. Contract time 540 days; bidding five units for Organized Reserve Corps. Serial No. 1150. 19 24 53 CD 4-24.

† Wis., Milwaukee—ARMORY—B.A. 6/8—U. S. Eng. 1819 Dechamdeau Mart, Chicago 54, Ill. Armory and vehicle storage bldg., incl. appurtenant mech. services (Inv. No. 1501-11-12-53). CD 4-24.

▲ N. Y., Brooklyn—CITY PRISON and DEMAND SHELTER—B.A. 6/14 (DI. P. W.)—Municipal Bldg., New York. Zone 7. general, electrical, plumbing, heating, ventilating and refrigerating mechanical work for construction of City Prison and Remand Shelter, Atlantic Ave. Bounded by Boerum Pl. and State St. Plans, specifications, general conditions, $25 each from Alfred Hopkins & Assoc., 415 Lexington Ave., New York 17, N. Y., archts. CD 11-1-46 and CD 11-15-46.

LOW BIDDERS

Conn., Clinton—SCHOOL—Town Special School Bldg. Com., Town Hall, Apr. 17. 1 story, brick, steel, concrete, 5 rms., cafetorium, kitchen, 400 pupils. Rear of Fenn Rubber & Sponge Co., 12 S. Main St., Torrington. $405,000. Est. $400,000. CD 4-24.

Md., Easton—OFFICE—State Rds. Comm., Baltimore. May 2. 2 story, 32x40 ft., concrete block, storage, office and bldg. 1 story, 16x144 ft., concrete block, shop and shed bldg., incl. water supply sys. and sewage disposal plant, on State Rds. Comm. Property, Rte. 50, Cont. T 131.1.215, Talbot Co., Area 2. Engr. Jos. Lomb Co., Inc., Cambridge, Md. $99,981. CD 4-17.

Md., Upper Malboro—SCHOOLS, Prince George Co. Bd. of Educ., Upper Marlboro. May 2. Academic classroom and teaching facilities for Bladensburg and Brentwood High schools addn. from A. M. Collegio & Sons, 1214 Good Hope Rd., S.E., Wash., D. C. $385,645. CD 4-20.

▲ Pa., Somerset—PATIENTS, etc.—General State Auth., 18 and Herr Sts., Harrisburg. May 3. general contract (altered patients bldg. at Somerset State Hospital, from Ritter Bros., 1511 N. Emerson St., Harrisburg, $452,795. General contract boiler plant from Nazarian Corp., 6219-21 Broad St., Pittsburgh. $175,000. Heating, ventilating and refrigerating work from Joseph Liberti, Ave., Pittsburgh. $112,218. General contract steam distrib. sys. and boilers from Nazarian Corp., 6223 Baptist St., Pittsburgh, Zone 21. $211,000. Heating for steam distrib. sys. and boilers from Walther Heating & Supply Co., 1224 Urban Ave., Windber. $66,508. Electrical work for steam distrib. sys. and boilers from Joseph Liberti, Ave., Pittsburgh. Zone 19. $150,940. CD 4-17.

CONTRACTS AWARDED

Calif., Petaluma—SCHOOL—Petaluma City Elementary School Dist., Petaluma. 1 story, 8 classrooms, multipurpose room, kitchen, etc., on Petaluma Blvd. South and Riverfront Rd. Ridley & Wilson, Petaluma, archts. Bids $255,955. Bids 4-20. CD 4-7.

Calif., Santa Rosa—GYMNASIUM—Santa Rosa City Schools, Santa Rosa. 1 story, 144x160 ft. concrete and steel, 2,000 seat gymnasium and music bldg. on Elsie Allen High School site, Bennett Valley Rd. and Yulupa Ave. $247,500. Awarded 4-25 to Cahoon Construction Co., Petaluma. Ave., Petaluma. CD 3-12.

▲† N. C., Salisbury—HOSPITAL—Veterans Admin., Washington, D. C. 2 story, 200 bed hospital bldg., incl. dietetic service, X-ray, physical therapy, laboratory, operating suite, etc., on Statesville Blvd., S. W. Cont. No. 11-6. $11,634,626.

COMMERCIAL BUILDINGS

BIDS ASKED

Fla., Quincy—

▲ Pa., Penn—

▲ Ill., Chicago—

▲ Tex., Wichita—

Ill., Bellaire—

Ill., Evanston—

Md., Baltimore—

SOON LETS CONTRACT

Ky., Henderson—SCHOOL—Holy Name Parish, Henderson, Diocese, let contract 2 story, basmt., 144 x 180 ft., brick, high school and gymnasium, etc., auditorium, boys' storage facilities, $4,000,000. Engr. Maier, 1037 Bayard Park Dr., Evansville, Ind., archt. CD 2-23.

LOW BIDDERS

Del., Clayton—HOME—Co. Farm Force 2201 Todds Lane, Wilmington, rejected bids, home $250,000. Will re-advertise CD 4-14.

CONTRACTS AWARDED

▲ Ala., Mobile—HOMES—Shelby Constr. Co., 4420 Ford Ave., New Orleans, La., 175 homes. Owner bonds. Approx. $1,000,000.

▲ Calif., Arcadia—DWELLINGS—Lehnoe Corp., 9244 Olympic Blvd., Beverly Hills, 196 stucco dwellings in Tract 16280. Owner bonds. $1,352,400. D. Freedman, 456 Commercial Center Beverly Hills, archt.

▲ Calif., Downey—DWELLINGS—Boulevard Improv. Co., 640 S. Wilton Pl., Los Angeles, 214 stucco dwellings in Tract 13441. Owner bonds. $1,604,810. E. H. Fickett, 5678 W. Pico Blvd., Los Angeles, archt.

Calif., Hayward—RESIDENCES—Alameda Homes Corp., 1500 Washington Ave., San Leandro, 43 residences in Tract 980. Owner bonds. $279,500.

▲ Calif., Los Nietos—DWELLINGS—Avalon Corp., 945 N. La Cienega Blvd., Los Angeles, 146 frame, stucco dwellings in Tract 16199. Owner bonds. $1,127,040. Wm. N. LaCienega St., Los Angeles. $1,127,040. Frank Green, 1415 Citrus Chase Blvd., Glendale, archt.

Fla., Panama City—HOUSING—Dpt. Air Force—Pentagon Bldg., Wash., D. C. Contractor's manager and finance, 450 unit housing Tyndall Air Force Base. W. H. Dennison & Sons, 1342 Madison Ave., Memphis, Tenn.

Ill., Chicago—EXCHANGE—Illinois Bell Telephone Co., 212 W. Washington St., Zone 6, telephone exchange addn., 100 E. W. Superior St. to Marion Constr. Co., 29 N. Wacker Dr., Zone 6. $260,000. Awarded 4-26. Holabird & Root, 400 W. Madison St., Zone 6, archts.

Ill., Chicago Heights—EXCHANGE—Illinois Bell Telephone Co., 212 W. Washington St., Chicago. 2 story, basmt. dial exchange bldg. to Charles C. Gerhardt, 1104 Western Ave., Zone 12. $300,000. Bids 4-17. Swanfeldt & Zeller, archts.

Ill., Rantoul—HOUSING—Dpt. Air Force—Pentagon Bldg., Wash., D. C. Contractor's manager and finance, 800 unit housing to Charles A. Gaynor & Sons, Jonathan Woodner Co., 1232 18 St., N. W., Wash., D. C.

Minn., Minneapolis—APARTMENT—Jay Dee Grove Corp., 4901 Fortieth Terrace S. apartment to Rosenbloom & Co., 219 Foshay Tower, $800,000.

Mo., St. Louis Co.—HOUSING—McDowell Bros. & Realty Co., 223 N. Kingshighway Blvd., St. Louis, Zone 21. Sixty-two 1-story, 24 x 43 ft. frame dwellings with concrete foundations, 2 bedrooms, 1 bath, 1 car garage. Owner bonds. Est. Project Area $250,000.

N. J., Pennsauken—RESIDENCE—Arthur Rosenberg, Penn Ave., residence to Arthur Rosenberg Co., 1819 Broadway, N. Y. $256,000.

Tenn., Chattanooga—APARTMENT—Montview Apartments, Federal Dr. to Wallace N. Mowell Co. $300,000. CD 9-16.

Wis., Milwaukee—APARTMENT, etc.—Royal Plaza Realty Co., 229 E. Wisconsin Ave., Zone 2, 144 one-bedroom units, 2 stories, 103 x 103 ft., basement and 2 x 220 ft. parking area. $750,000.

Wyo., Cheyenne—[illegible] $400,000.

[illegible] $350,000.

[illegible] $400,000.

INDUSTRIAL BUILDINGS

BIDS ASKED

W. Va., Fort Atkinson—

LOW BIDDERS

Fla., Miami—WAREHOUSE—Florida Brick Co., 410 S. Dixie, refrigerated warehouse from St. John Co., Inc., 290 N.W. 54 St., Miami. $85,000.

Mo., Springfield—GARAGE, etc.—Tom Phelps Chevrolet Co., 520 St. Louis St., 2 story, 72x100 ft. garage addn. to bldg., from Chapman & Brunner, 1210 Boatmen's Bldg., archts. $227,400. Johnson & Richey, Landers Bldg., archts. CD 3-9.

Tex., Lubbock—GRAIN STORAGE—Morrow Grain Storage, Inc., Morrow. Apr. 26. one or two reinforced concrete, metal, metal type grain storage structures, 1 million bu. capacity, from Robert E. Maxey, Fox Avenue & 2. $247,000. 1 unit. $494,000. 2 units. CD 4-24.

Tenn., Rockwood—BOTTLING PLANT—Rockwood Coca-Cola Co., Rockwood. Apr. 26. bottling plant, from Tennessee Valley Constructors, Inc., Monteagle. $200,000. CD 4-14.

CONTRACTS AWARDED

Conn., Danielson—WAREHOUSE—United Cooperative Farmers, Inc., 511 Broad St., Fitchburg, Mass. 1 story, 75x150 ft. concrete, steel warehouse to Archibald Torrance, Prospect St., Norwich. $68,000. Bids 1-31. 14.

Ill., Chicago—PLANT—Owner Dpt., Ernest A. Wiberg, 1442 Morse, Zone 26, steel tank, concrete plant addn. and alterations to Wm. Simpson Constr. Co., 184 N. La Salle St., Zone 2. $195,000. CD 5-3.

Mo., St. Louis—WAREHOUSE, etc.—Rieder Co., Inc., 5350 National Bridge Ave., Zone 29, 1 story, 100x200 ft. precast concrete, concrete, steel storage, warehouse and office and 5625 29 National Bridge Ave. to Robinson Constr. Co., 5540 W. Park Ave., Zone 10. Simpson & Johnson, Chemical Bldg., 721 Olive St., Zone 1. archts. CD 9-29.

Mo., St. Louis—WAREHOUSE, etc.—Ford Steel Co., 4734 N. Broadway, Zone 2, 1 story, 93x140 ft. steel, concrete warehouse and office addn. to 5044 Fullerton Ave. to H. B. Ayres Constr. Co., 5554 West Park Ave., Zone 10. Approx. $70,000.

Md., Sparrows Point—WAREHOUSE—Kheem Mfg. Co., Sparrows Point, 1 story, brick, steel, steel, concrete, metal warehouse with 23x111 ft. extension, 17x100 ft. wings, 19x400 ft. No. 4 mill bldg. and 2 railroad sidings to Morrow Bros., Inc., 2315 N. Charles St., Baltimore. Bids 4-24. CD 4-24.

▲ N. Y., Syracuse—SODA ASH PLANT—Solvay Process Div., Allied Chemical & Dye Corp., Milton Ave., Circle Soda ash plant at Solvay, near here, to McGraw Construction Co., 122 Middletown St. Total cost approx. $20,000,000.

Tenn., Bristol—MANUFACTURING—Bristol Aluminum Products Co., 1 story, brick, steel, concrete, 5th addn. to mfg. plant, 25 ft. to Alley Constr. Co., Bristol. Approx. $100,000.

N. S., Halifax—PLANT—Shaw Ltd., 328 Argyle St., to add 1 story, 100 x 100 ft. to factory building at Dartmouth, Halifax County, N.S., Royal Bank Bldg., New Glasgow, N.S., archts. $275,000. J. L. Darby, Bedford, archt.

UNCLASSIFIED

BIDS ASKED

† Nebraska—[illegible]—STEEL—B.A. 5/23—Bureau Reclamation, Dpt. Interior, P.O. Pk. 280, 504 Commerce Bldg., Kansas City, Mo., for structural steel for Gavins Point Dam, Sec. VII, Unit No. 1. Missouri River Basin Proj. CD 5-18.

South Carolina—RURAL ELECTRIFICATION—B.A. 5/23—Rural Electrification Admin., Dpt. Agriculture, Washington, D. C. Power Distribution System, Cherokee Electric Cooperative, Inc., Gaffney, S. C. Area coverage, Cherokee, Union, Chesterfield, Lancaster, Chester, Fairfield, Newberry, Laurens, Greenville, Spartanburg and Spartanburg Counties. Approx. $1,500,000. CD 3-29-49.

California—TRAFFIC SIGNAL SYSTEMS—[illegible]—B.A. [illegible]

California—TRAFFIC SIGNAL SYSTEMS—[illegible]—B.A. [illegible]

† Colo., Cortez—[illegible]

LOW BIDDERS

Tex., Cleveland—[illegible] $54,400.

†Okl., Brokenbow—[illegible]

SOON LETS CONTRACT

Calif., Los Angeles—[illegible] $300,000.

Conn., Storrs—[illegible]

(Continued on page 104)

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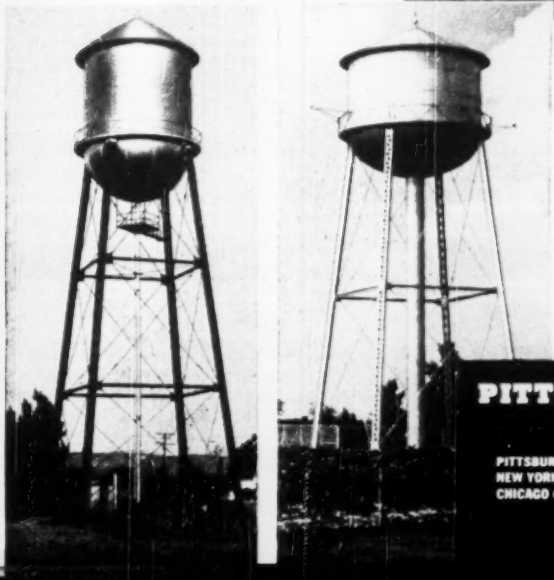

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DALLAS (1). . . . . 1219 Praetorian Bldg.
SEATTLE . . . . . 922 Lane Street
SANTA CLARA, CAL. . . . . 621 Alviso Road

Continued from page 102

Fla. ... $56,415

Fla. RURAL ELECTRIFICATION ADM. ... Tampa, Fla. ... $105,713

Ind. Evansville—DRIVE-IN THEATRE ... $100,000

Miss. Bay Springs—NATIONAL GUARD ARMORY ... $301,000

Wash. Ephrata—ARMORY ... $50,000

PROPOSED PROJECTS

WATER SUPPLY

Calif. Santa Cruz—City, City Hall, Santa Cruz. $600,000 ...

Mich. Escanaba—City, ... $600,000 ...

▲ N. J. Jersey City—... $170,000 ... $375,000 ... $470,000 ... $225,000

N. C. Brevard—... $200,000 ...

Ore. Madras—City, ...

Wyo. Thermopolis—... $382,000

Que. Sillery (Quebec City Postal Dist.)—Town, ... $175,000 ...

SEWERS, WASTE DISPOSAL

Calif. Nevada City—City, ... $130,000

Calif. Red Bluff—... $255,000

Calif. ...

▲ Conn. Hartford—... $1,000,000

Fla. ...

▲ Ky. Frankfort—...

BRIDGES

La. Baptista—...

Mo. St. Louis—...

Ont. Cornwall—City, ... $550,000

STREETS AND ROADS

Tex. Terrell Hills (San Antonio P. O.)—City, ... $150,000

Wyo. Cody—City, ... $526,000

Wyo. Newcastle—Town, ... $104,256

EARTHWORK, WATERWAYS

Neb. Grand Island—Central Nebraska Irrigation Dist., ... Approx. $200,000. R. F. ... CD 5-8-50.

New Jersey—Sea Jersey Transportation Authority, ... $300,000

▲ Tex. Galveston—... $1,000,000 ... Palmer & Baker, ... George F. McGinty, City Manager, to engr. CD 4-14.

AIRPORTS

▲ Neb. Omaha—ADMINISTRATION BLDG.—City, City Hall, 18 and Farnam Sts., ... by J. T. Allan, Brandeis Theatre Bldg., ... administration bldg. at Municipal Airport. $1,500,000. CD 2-28.

▲† Tex. Kelly Air Force Base—BUILDINGS, etc.—Dept. Air Force, The Pentagon, Washington, D. C., $40,000,000 ... 16 hangars, type bldg., $5,499,050; supply warehouse, $178,500; ... $50,000; fence for vehicle, warehouse area, $73,350.

LATIN AMERICA

Ecuador, Quito—Republic of Ecuador, Quito, plans three 14,000-kw. power developments and 90 transformer substations ... $2,500,000 ... Ministry of ... Pedro ...

Mexico, Mexico City—... $300,000

Mexico, Mexico City—... $400,000

Mexico, Tuxtlan Gutierrez—... $1,440,000

Mexico, Vera Cruz—... $360,300

Panama, Panama City—... $667,500

Panama, Panama City—... $5,000,000

Venezuela, Canoa Falls—...

PUBLIC BUILDINGS

▲ Ala. Auburn—... $2,500,000

▲ Calif. ...

▲ Calif. ...

▲ ...

▲ ...

▲ ...

▲ ...

Kan. Ulysses—... $475,000

▲ Mass. Boston—... $500,000

▲ Mass. Cambridge—... $6,000,000 ... CD 1-26.

▲ Mass. Medford—... Approx. $2,000,000

▲ Minn. Excelsior—... $1,500,000 ... W. O. Nelson ...

▲ Minn. Minneapolis—... Approx. $360,000 ... $600,000 ... $600,000 ... $450,000 ... CD 2-22 ... $450,000 ...

Ore. Central Point—... $500,000 ...

Ore. Portland—... $500,000 ...

Pa. Phila.—BARRACKS—General State Auth., 18 and Herr Sts., Harrisburg, ... barracks bldg. for Pennsylvania State Police, Belmont Ave. $480,000. A. F. ...

▲ R. I. Providence—HOUSING—Providence Housing Auth., 24-31 Broad St., ... Mother Cabrini Blvd., ... Mother Cabrini & Admiral, 424 Industrial Trust Bldg., 3-story, brick, concrete garden apartments, $6,500,000. CD 3-7.

Tex. Abilene—... $250,000 ...

▲ Tex. Dallas—HOSPITAL—City, City Hall, Main and Harwood Sts., ... Dr. Kurt A. ... $6,400,000 ... $250,000 ... $400,000 ... $750,000 ... $75,000 ... $125,000 ...

▲ Tex. Gonzales—... $1,575,000

Tex. Kilgore—... $400,000

Tex. McCamey—... $250,000 ... $75,000 ...

Tex. Sherman—... $250,000

Tex. Sweetwater—... $500,000

Utah, Bingham City—... $500,000

Wash. Fort Garry—... $500,000

Que. Bedford—... $400,000

Que. Valleyfield—... $400,000

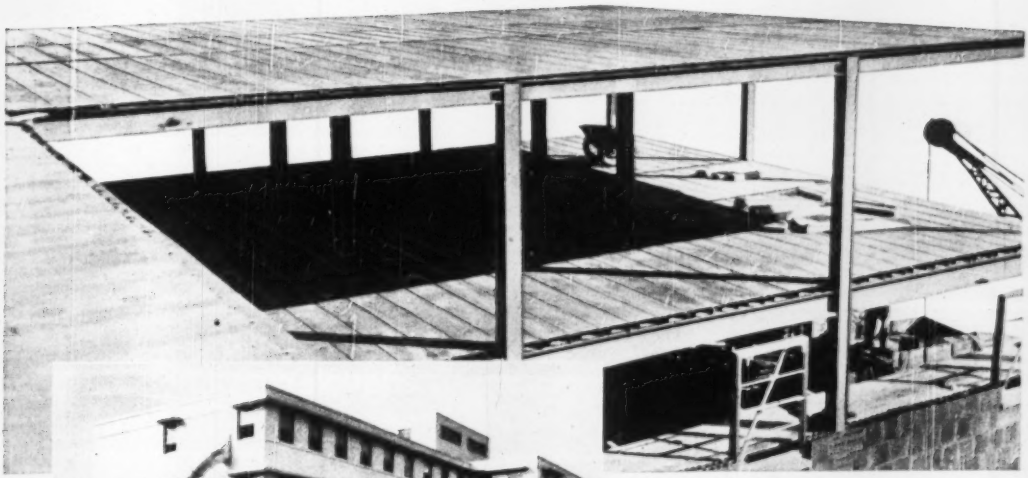
COMMERCIAL BUILDINGS

▲ Ark. Pine Bluff—... $1,000,000

Calif. Baldwin Park—... $116,600

▲ Calif. Walnut Creek—...

Continued on page 106



Duval County Psychiatric Hospital, Jacksonville, Fla., during construction and completed. Note the use of long-span Fenestra "D" Panels for floors. *Architects:* Reynolds, Smith & Hill. *Contractor:* The George D. Auchter Co.

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(Continued from page 104)

Parking Area, San Francisco, Wood-ey center, incl. 1169 front feet of stores, $3,000,000. CD 12-21-49.

▲ Conn., Manchester—HOUSING—Lower Manor Estate, 412 Middle Turnpike, 150 single houses, Woodbridge Farm section, $1,250,000.

Conn., Manchester—RESIDENTIAL DEVELOPMENT—Ralph J. Holl, 1209 Main St., 80 family units, Manchester Green, $650,000.

▲ Ill., Chicago—HOSPITAL—Mercy Home for Boys and Girls, 3000 S. Ashland Ave., 2 story addition, 100 beds, 111 N. Wabash Ave., Zone 2, Mundie & Jensen, $1,500,000.

Kan., Wichita—CHURCH—Second Sacramento Evangelical Church, 1 story, plans by Lowery, Schmidt, Waxse & Petrie, 1450 E. 37 St., $500,000.

Md., Baltimore—HOUSING—Roger Development Co., 321 Aisenstein Jr., 196 two-story, basement, 2 story, 17, 18, and 18 ft. 2 family dwellings, 3100 block W. Lexington St., 1600 block W. Saratoga St., 1600 block W. Monument St., 2221 and 2300 block Edgewood St., 1700 block Argonne St., 1700 block Edgewood St., $585,000.

Mass., Newton—MUNICIPAL CLINIC—Commissioner of Schools, Peter Gregor, city, Newton, county center and temple, $500,000.

Mass., North Grafton—RESIDENCE—Real Estate & Mortgage Sales, Inc., 306 Main St., Worcester, plans by Arthur G. Mansueto & Assoc., 340 Main St., Worcester, 60 concrete slab, brick faced, 6 room houses, Bergdon Hill Rd., $400,000.

Mass., Woburn—HOSPITAL—Choate Memorial Hospital, 21 Warren Ave., plans by Warren Bldg., 511 Boylston St., Boston 2 story, 80 bed, hospital wing, Approx. $250,000. Cleverdon, Varney, Page, 120 Tremont St., Boston, engrs. CD 12-14-49.

Mo., Clayton (St. Louis P. O.)—STORE—Kinney Shoe Corp., 1 Kinney Bldg., Richard J. Kilbe, pres., 608 Washington Ave., St. Louis, Zone 1, plans by Design, Inc., 906 Olive St., St. Louis, Zone 6, 1 story, brick, stone, 3000 sq. ft. dept. store, Forsyth Blvd., east of Hanley Rd.

Neb., Lincoln—HOSPITAL—Addition, $400,000.

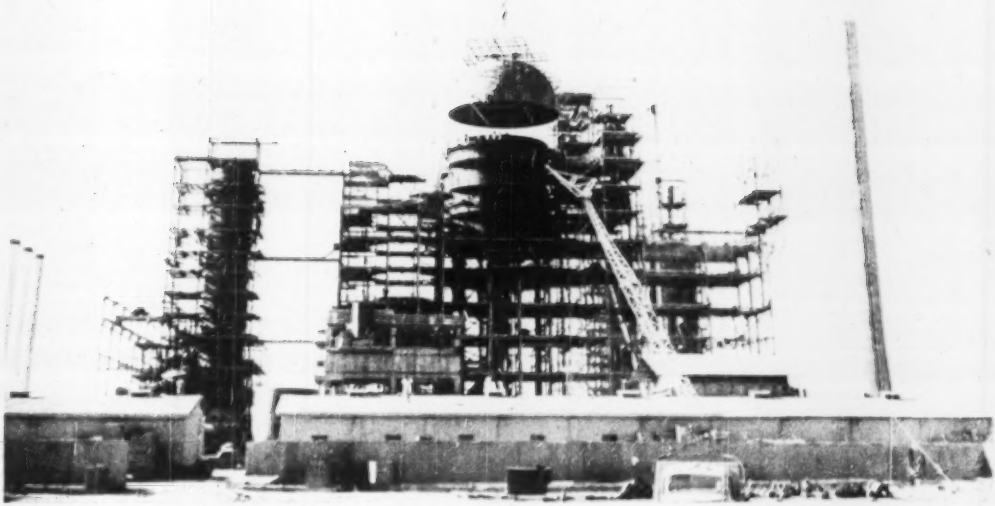
N. Y., Astoria—TUNES and OFFICES—Agent Annex, 31-00 47 Ave., 1 story, plans by George Pelham, architect, 24 A. st., New York, Zone 16, 2 story stores and offices, 31-00 47 Ave. and 31 Ave., $250,000.

N. Y., Brooklyn—CHURCH—St. Ephrem's Roman Catholic Church, 7415 Fort Hamilton Parkway, plans by Paul Cassata, 111 Fifth Ave., New York, Zone 3, church, 7413-21 Fort Hamilton Parkway, $600,000.

N. Y., Brooklyn—APARTMENT—Avenue U and 12th St., 1 story, plans by Albert A. Kahn, 44 St. Pauls Pl., $250,000.

N. Y., Douglaston—CHURCH—St. Anastasia Roman Catholic Church, Alameda Ave., and 24 St., plans by Henry J. Bernardon, 52 Vanderbilt Ave., Brooklyn, 2 story, 4 story church at present, $265,000.

N. Y., Flushing—APARTMENT—Daniel Town, Estate, Main St., 2 story apartments, Kissena Blvd., Zone 3, 2 story apartments, Kissena Blvd., Zone 3, 2 story apartments, Main St



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Company _____

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City _____ Zone _____ State _____

Save Time with the DIRECT POUR!

THE OLD time-wasting crane method

THE NEW cost-cutting MultiFoote with HighLift Boom

FIGURING on pouring bridge piers, abutment, walls or retaining walls? No matter what it is the MultiFoote with HighLift Boom can save you money with the Direct Pour.

The MultiFoote can handle a wall form with almost the snap and click of a road pouring job. It brings you the capacity and output of a paver and it is the only paver that can put this output up 23 ft. or above. It gives you better control of the mix, saves the time always wasted in transferring the mix from one machine to another and frees the crane for other work. Your MultiFoote on wall pouring will eliminate false work and save time and money.

If you have a pouring job to do, check into the MultiFoote and the HighLift Boom. Let us tell you what others are doing with it. There is a Multifoote Sales Representative near you.

THE FOOTE COMPANY, INC.

Subsidiary of Blaw-Knox Co.

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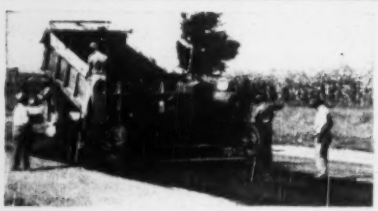
MULTIFOOTE PAVER

FOR EVERY PLACE CONCRETE MUST BE POURED

A BLAW-KNOX PRODUCT



Do you lay Black Top? The Adnun is an all 'round Black Top and Material Spreader. One machine for black top, stone, slag, cinder, sand or soil cement. Does the job with less cost for subgrade preparation—Ask for details.

ADNUN BLACK TOP PAVER

CONSTRUCTION REPORTS-Second Section

WATER SUPPLY

BIDS ASKED

BRIDGES

BIDS ASKED

STATE HIGHWAY LETTINGS

LOW BIDDERS

CONTRACTS AWARDED

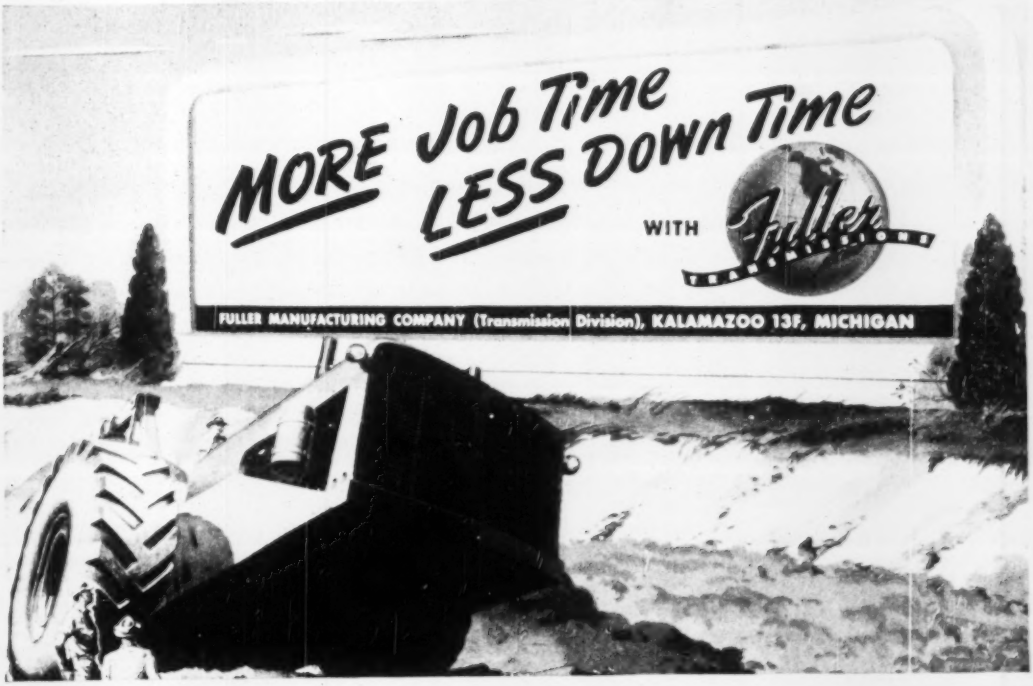
SEWERS, WASTE DISPOSAL

BIDS ASKED

STREETS AND ROADS

BIDS ASKED

STATE HIGHWAY LETTINGS



Minn., Worthington—B.A. 6.2 mi. Nobles Co., W. C. Thom, Jud., grading 5.4 mi. between Co. A-3 Rd. 28 E. Lismore and west county line, SP 13-518-02, SAM 21, Min. Proj. S-1071(4), grading 5.4 mi. between Trunk Hy. 91 and west county line, SP 51-619-02, SAM 81, Min. Proj. S-4(4)-(2), $55,605, Plans deposit $1.30, H. W. Berg Co., Hy. engr. CO 9-16-50.

LOW BIDDERS

▲ New Jersey—New Jersey Turnpike Auth., Trenton, May 9, Contr. 24, grading, drainage for 13 mi. Turnpike from West Shore R. to Route 1, Sec. 7, Turnpike from West Shore R. to Route 1, Sec. 7, [illegible] & Conte Corp., 631 Main Ave., Passaic, $1,838,685, CO 4-49.

▲ Pennsylvania—State Hy. Dept., Harrisburg, May 9, Contr. 24, grading, drainage, bituminous surface treatment, bituminous surface treated highway, consisting of reconstruction of pavement 24 ft. wide on each side of an earth or stone base area varying 21 to 23 ft. in width, construction of pavement 24 ft. wide and variable in width, [illegible] and [illegible] and [illegible] and

TOUGH "TALLAPOOSA CROSSING"
called for
TOUGH J&L WIRE ROPE

J&L STEEL

Above: Pulling a 150-foot section of steel pipe into the river bed with J&L Wire Rope connected to the drum of a winch tractor.

Left: Four side-boom tractors, equipped with J&L Wire Rope, guide the pipe into the river.

Midwestern Constructors, Inc., lays gas pipe lines . . . uses J & L Wire Rope in vital operations

Midwestern Constructors, Inc., had a tough problem in laying a 30-inch gas pipe line through the solid granite bed of the Tallapoosa River, near Wadley, Ala. But with the help of J&L Wire Rope, another link was completed in the 2,250-mile pipe line which eventually will supply New York City with 500,000,000 cubic feet of gas daily from Texas fields.

Here was the situation: A steep slope . . . swollen waters and swift currents . . . solid granite river bed! But every week the job was finished despite adverse conditions, including cold and rainy weather.

Wire ropes were strung across the river to anchor equipment against swift currents. A trench five feet deep and 315 feet long was blasted in the river bed. Tow "cats," side-boom "cats," a backhoe, and a clamshell went to work cleaning out shattered rock and moving the pipeline into position—all equipped with J&L Preformed Wire Rope.

Like many other large contractors, Midwestern Constructors, Inc., of Tulsa, Okla., has standardized on J&L Wire Rope for all its heavy-duty equipment. And for good reason. They have found that J&L Wire Rope lasts longer on tough jobs, tackles the safety factor and reduces down-time resulting from wire rope replacements.

J&L Wire Rope is Precisionbilt with quality-controlled steel. Wires, drawn with uniform precision, are laid together accurately to provide longest possible wear.

Our handbook, "Wire Rope Is a Machine," tells how to operate and maintain wire rope for maximum service. It is written in easy-to-understand language. If you use wire rope, you'll want a copy. Return the coupon today!

Jones & Laughlin Steel Corporation
3 Jones & Laughlin Building
Pittsburgh 30, Pa.

Please send me a free copy of your new handbook, "Wire Rope Is a Machine."

Name _____

Company _____

Address _____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products of stainless and special alloy steels.

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

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CONCRETE →

Here you will get the truth about what pipe is best for a specific job. No favorites are played because Vitrified pipe and Concrete pipe are both available in all sizes.

Modern plants give advantage in location • clay deposits give advantage in raw material • modern mechanized facilities give advantage in manufacturing and pricing. Immense capacity and years of progressive know-how and leadership give assurance of best technical advice and product.

Check Universal Vitrified - United States Concrete for the proper pipe to use for any job.

PRODUCTS

Sewer Pipe—Vitrified	Slipseal Sewer Joint	Fire Clay
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Liner Plates	Meter Boxes	Stove Pipe
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Baltimore, Md., Cincinnati, Ohio, New Philadelphia, Ohio, Palmyra, Ohio (2), Uhrichsville, Ohio (2)

UNIVERSAL SEWER PIPE CORPORATION
UNITED STATES CONCRETE PIPE COMPANY
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CONTINENTAL STEEL CORPORATION
Kokomo, Indiana

Please send FREE copy of Fence Protection booklet showing property protected.

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Address
City State

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CONTINENTAL STEEL CORPORATION

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Only Borden Metal Products

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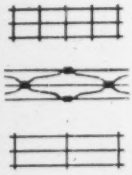

- Genuine Tailor Made Floor Gratings
- Free from Warps - Buckles or Camber
- Level-Even Surfaces - Gives Proper Distribution
- Properly Designed for Symmetrical Appearance—Gives Graceful Lines of Whole Pattern
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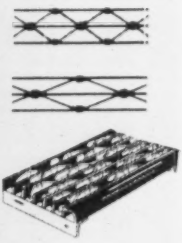

- Rectangular or Riveted Type
- Steel, Aluminum or Stainless Alloy
- Bar Sizes and Openings to Meet All Requirements
- Engineering Advice and Recommendations on Special Problems
- Gratings Accurately Marked
- Erection Diagrams Where Required
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Modification of Bidder Qualifications and Postponement of Bids

Sewage Treatment Plant

(Continued on page 116)

Engineering News-Record

Reaches Your Local Contractors

OFFICIAL PROPOSALS
(Continued from page 115)

Bids May 29, 1950 . . . . . (750)

THE PORT OF NEW YORK AUTHORITY
NEW YORK INTERNATIONAL AIRPORT
APRON, PERIMETER AND TAXIWAY
LIGHTING FOR HANGARS 2, 3 AND 5
CONTRACT NYA-22

Sealed proposals for furnishing and installing lighting facilities for the apron, perimeter and taxiways for Hangars 2, 3 and 5 at New York International Airport will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1000, 111 8th Ave., New York, N. Y., until 2:00 P.M. Prevailing Time, on the 23rd day of May, 1950, at which time and place said proposals will be publicly opened and read.

Contract documents may be seen at the office of the Chief Engineer and copies will be furnished upon deposit of $25.00 per set. No deposit will be refunded if the drawings are returned in good condition within ten days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Howard S. Cullman,
Chairman

New York, May 15, 1950.

Bids May 31, 1950 . . . . . (745)

State Road Work

Sealed proposals will be received by the State Highway Department at the office of the District Engineer, [illegible] P.M., E.S.T., on May 31, 1950, and will be opened at that time and place publicly and read aloud, covering the following approximate quantities:

CONTRACT 1100
Bituminous Surface Treatment
[illegible]
New Castle County
22,000 Gal. R.C.-1 Asphalt, Furnished & applied
10,000 Gal. R.C.-2 Asphalt, Furnished & applied
26,000 Tons Crushed Slag, Furnished & applied
CONTRACT 1101
Bituminous Surface Treatment
[illegible]
Kent County
70,000 Gal. R.C.-1 Asphalt, Furnished & applied
175,000 Gal. R.C.-2 Asphalt, Furnished & applied
5,000 Tons Crushed Slag, Furnished & applied
4,000 Tons Crushed Stone, Furnished & applied
CONTRACT 1102
Bituminous Surface Treatment
[illegible]
Sussex County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
CONTRACT 1103
Bituminous Surface Treatment
[illegible]
Kent County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1104
Bituminous Surface Treatment
[illegible]
New Castle County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1105
Bituminous Surface Treatment
[illegible]
Kent County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1106
Bituminous Surface Treatment
[illegible]
Sussex County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1107
Bituminous Surface Treatment
[illegible]
New Castle County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1108
Bituminous Surface Treatment
[illegible]
Kent County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1109
Bituminous Surface Treatment
[illegible]
Sussex County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1110
Bituminous Surface Treatment
[illegible]
New Castle County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1111
Bituminous Surface Treatment
[illegible]
Kent County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1112
Bituminous Surface Treatment
[illegible]
Sussex County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1113
Bituminous Surface Treatment
[illegible]
New Castle County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1114
Bituminous Surface Treatment
[illegible]
Kent County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1115
Bituminous Surface Treatment
[illegible]
Sussex County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1116
Bituminous Surface Treatment
[illegible]
New Castle County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1117
Bituminous Surface Treatment
[illegible]
Kent County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied
CONTRACT 1118
Bituminous Surface Treatment
[illegible]
Sussex County
[illegible] Gal. R.C.-1 Asphalt, Furnished & applied
[illegible] Gal. R.C.-2 Asphalt, Furnished & applied
[illegible] Tons Crushed Slag, Furnished & applied
[illegible] Tons Crushed Stone, Furnished & applied

Plans and specifications may be seen at the office of the District Engineer, Dover, Delaware, and copies may be obtained upon payment of $5.00 per set.

STATE HIGHWAY DEPARTMENT
M. Alan Walker,
Chief Engineer

May 15, 1950.

OFFICIAL PROPOSALS

New Castle County
3,500 Tons Furnished Cover
Highways Trucks
CONTRACT 1104
Maintenance Patching Material
[illegible]
New Castle County
500 Tons Furnished & Applied
CONTRACT 1105
Maintenance Patching Material
[illegible]
Kent County
975 Tons Furnished & Applied
CONTRACT 1106
Maintenance Patching Material
[illegible]
Sussex County
2,500 Tons Furnished & Applied
CONTRACT 1107
Hot Mix Asphalt Surfacing
Kent County Route No. 10A & 71
2,200 Tons Hot Mix Asphalt Surface Furnished & Applied
CONTRACT 1108
Unclassified Excavation, General
Grading and Paving
[illegible]
New Castle
County 23 M. [illegible] 2,100 L. F. 24 in.
Kent County 3 M. [illegible] 2,100 L. F. 24 in.
Sussex Co. 3 M. [illegible] 1,[illegible] L. F. 24 in.
CONTRACT 1111
Grading, Bituminous Treatment & Concrete Bridge Structures
2,000,000 Cu. Yds. Unclassified Excavation
CONTRACT 1112
Diesel Fuel Requirements 1950-51
New Castle County
12,000 Gallons Diesel Fuel Oil
CONTRACT 1113
Diesel Fuel Requirements 1950-51
Kent County
15,000 Gallons Diesel Fuel Oil
CONTRACT 1114
Diesel Fuel Requirements 1950-51
Sussex County
2,500 Gallons Diesel Fuel Oil
CONTRACT MC-1
Mosquito Control Spraying
[illegible]
20,000 Gallons Fuel Oil No. 2 Kerosene Type Cutback Asphalt
CONTRACT MC-2
Mosquito Control Spraying
[illegible]
10,000 Gallons Fuel Oil No. 2 Fuel Oil

Attached to the Special Provisions in the proposals specifications and contract documents.

Performance bonds will be required for the faithful performance of the contract and for the payment of all persons performing labor and furnishing materials in connection therewith.

Monthly payments will be made for 90% of the estimated value of the work completed each month.

Bidders must submit proposals on forms furnished by the Department.

The right is reserved to reject any or all proposals.

The contract will be awarded or rejected within [illegible] days after the opening of proposals.

Plans and specifications may be seen at the office of the District Engineer, Dover, Delaware, and copies may be obtained upon payment of $5.00 per set.

STATE HIGHWAY DEPARTMENT
M. Alan Walker,
Chief Engineer

May 15, 1950.

U. S. Government

MISSOURI RIVER BASIN PROJECT, Dodge Stations, Casper, Wyoming, May 1, 1950. Specifications No. VH-126. NOTICE IS HEREBY GIVEN that sealed bids on specifications No. VH-126 will be received at Room 2005, Old Customs Building, Casper, Wyoming, until 10 a.m., Mountain Standard Time, May 23, 1950, and then publicly opened for furnishing and delivering certain material for Solo Substation, Transmission Section, Norfolk, Missouri River Basin Project.

Copies of the Standard Forms and of the specifications may be obtained from the following officers of the Bureau of Reclamation: A. A. Batson, Regional Director, New Custom House, Denver, Colorado; and E. F. Matthews, Area Engineer, Casper, Wyoming. Attention is directed to the specifications for the conditions to be observed by bidders. Copies of the specifications may be obtained from the Bureau of Reclamation, Denver, Colorado, or from the Area Engineer, Casper, Wyoming, upon payment of $[illegible] per copy, not returnable.

(7[illegible])

Department of Commerce, Bureau of Public Roads, May 1, 1950. SEALED BIDS will be received at the office of the Bureau of Public Roads, Gatlinburg, Tennessee, until 1:30 p.m., E.S.T., on June 1, 1950, for construction of Project 2X1-2Y, Blue Ridge Parkway, Buncombe, Haywood and Swain Counties, North Carolina, Item No. 1, Unclassified Excavation, 1,[illegible],000 Cubic Yards; Item No. 2, Crushed Stone Surface Course and other work. Length of work: [illegible] miles. The approximate quantities of the more important items are as follows: Item No. 1, 1,[illegible],000 cu. yds. of Excavation from the Cricket Gravel or Crushed Stone Base Course and 2,500 Cubic Yards of Surface Treatment. Minimum wage rates have been fixed as required by law. Full plans and specifications, a deposit of which [illegible] required, may be seen at the Bus Transportation Office, Gatlinburg, Tennessee, or at the office of the Bureau of Public Roads, Washington, D. C. Bidders will be required to insert their bids within 10 days after opening of bids. Copies of specifications and proposal forms may be obtained from the office of the Division Engineer, 1710 Columbia Pike, Arlington, Virginia, or from the addresses given above. H. S. Fairbank, Division Engineer. (7[illegible])

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation, Sealed bid (Specification No. 6231) will be received by Bureau of Reclamation, Denver, Colorado, June 8, 1950, and then publicly opened for furnishing one (1) Steel Highway Bridge, [illegible] Span, Hungry Horse Project, Montana. Bidders are invited to be present. Specifications, address Bureau of Reclamation Building, U.S. Customs House, Denver, Colorado.

MICHAEL W. STRAUS, Commissioner.

(7[illegible])

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation, Sealed bid (Specification No. 6230) will be received by Bureau of Reclamation, Denver, Colorado, June 8, 1950, and then publicly opened for furnishing one (1) Steel Highway Bridge, [illegible] Span, for Hungry Horse, Hungry Horse Project, Montana. Bidders are invited to be present. Specifications, address Bureau of Reclamation, Building U.S. Customs House, Denver, Colorado.

MICHAEL W. STRAUS, Commissioner.

(7[illegible])

(Continued on page 117)

CONTRACTORS
WATCH
THIS SECTION
for New Projects

Publish your announcements thru the "Proposal Section" of Engineering News-Record and get their bids.

U. S. Government
(Continued from page 116)

OFFICIAL PROPOSALS

State Road Work

OFFICIAL PROPOSALS

New Jersey
Turnpike
Authority

(Continued on page 118)

OFFICIAL PROPOSALS

(Continued from page 117)

Bids: June 6, 1950 (723)

Sewage Treatment Work

THE ALTOONA CITY AUTHORITY
ALTOONA, PENNSYLVANIA

Sealed bids for the construction of the Easterly Sewage Treatment Works, in the City of Altoona, Blair County, Pennsylvania, will be received by the Altoona City Authority in the City Hall, at Altoona, Blair County, Pennsylvania, until 11 AM (D.S.T.), June 6, 1950, and then publicly opened and read aloud.

The work will be divided into five contracts designated as follows:

CONTRACT NO. 1—STRUCTURAL WORK
CONTRACT NO. 2—MECHANICAL WORK
CONTRACT NO. 3—ELECTRICAL WORK
CONTRACT NO. 4—HEATING & VENTILATING WORK
CONTRACT NO. 5—PLUMBING WORK

The work will be awarded to one general contractor under Contracts No. 1 and 2 in combination.

Information for bidders, Form of Bid, Specifications and Forms of Contract may be examined at the office of the City Engineer in the City Hall, Altoona, Pennsylvania, or at the office of Albright & Friel, Inc., Consulting Engineers, 121 South Broad Street, Philadelphia, Pennsylvania, and copies thereof may be obtained upon application and upon deposit of $30.00 for each set. The deposit will be refunded upon the return of the drawings and specifications in good condition within ten days after the opening of bids. Bidders who submit proposals will be refunded the amount of the deposit on receipt of a bona fide bid. The deposit will be refunded to others upon the return of the drawings and specifications in good condition within ten days after the opening of bids. If the drawings and specifications are not returned within the time stated, the entire amount of deposit will be forfeited.

A certified check or bid bond drawn to the order of the Altoona City Authority, equal to ten per cent of the amount of bid must be submitted with the proposal.

The proposal must be filed and sealed envelope marked "Proposal for Construction of Sewage Treatment Works, Contract No. ——" and addressed to H. Dillon Gwinn, Secretary and Manager, Altoona City Authority, Altoona, Pennsylvania, and the contract or contracts under which the proposal is submitted must also be shown thereon.

The Altoona City Authority reserves the right to reject any or all bids or waive any informality in any bid received and to accept any bid or portion of any bid deemed most favorable to the Authority. No bidder may withdraw his bid within thirty days after the actual date of the opening thereof.

H. DILLON GWINN,
Secretary and Manager
Altoona City Authority

May 4, 1950

PENNSYLVANIA TURNPIKE COMMISSION

Grading, Drainage & Paving

PENNSYLVANIA TURNPIKE COMMISSION

[illegible]

[illegible]

[illegible]

OFFICIAL PROPOSALS
(Continued from page 118)

Bids June 1, 1950 ... (259)

Contract No. 7—Anchorage Tops and Concrete Deck

THE DELAWARE MEMORIAL BRIDGE
NOTICE TO BIDDERS

Sealed proposals for construction of Anchorage Tops and Concrete Deck for The Delaware Memorial Bridge over the Delaware River near Wilmington, Delaware, will be received by the Delaware State Highway Department at the office of the Department in Dover, Delaware, and the Central American Trust Company in Wilmington, Delaware, until 11 o'clock A.M. Eastern Daylight Saving Time (10 o'clock A.M. Eastern Standard Time), June 1, 1950. Immediately thereafter proposals will be publicly opened and read at the Central American Trust Company in Wilmington.

The work will be let either as a single contract for the entire work (Contract No. 7) or else under two separate contracts, Contract No. 7A for the Anchorage Tops and Contract No. 7B for the Concrete Deck and Approach Work.

The entire work, approximately ... [illegible]

CONTRACT NO. 7

THE DELAWARE MEMORIAL BRIDGE
Concrete in Deck Slab ... cu. yds.
Concrete in Bridge Approach Slab ... cu. yds.

OFFICIAL PROPOSALS

Concrete in Anchorages ... cu. yds.
Concrete in Anchorage Towers ... cu. yds.
Reinforcing Steel ... lbs.
Structural Steel ... lbs.
Dimensional Stone Masonry and Copings ... cu. ft.

Work on Contract 7A shall begin as soon as the completion of the preceding contract and the availability of the site will permit, and with the expended option will allow work with no restriction for a period of 30 months after the execution of the Contract. Work shall be prosecuted in accordance with the [illegible]

Work on Contract 7B shall begin on ... 1951 and with the expended option will allow work with no restriction for a period of 30 months after the execution of the Contract. Work shall be prosecuted in accordance with the [illegible]

Bids shall be made upon forms ... [illegible]

Each proposal must be accompanied by ... [illegible]

Bidders must submit proposals ... [illegible]

Each proposal must be accompanied by an amount of cash, bond or certified check in the amount of ... [illegible]

The successful bidder will be required to furnish ... [illegible]

Bidders must submit proposals upon forms provided by the Department.

Each proposal must be accompanied by an amount of cash, bond or certified check in the amount of ... [illegible]

The successful bidder will be required to furnish ... [illegible]

Plans and specifications are on file for examination at the office of the Department in Dover, Delaware, and at the office of the Engineers, Howard, Needles, Tammen & Bergendoff, Kansas City, Missouri, and New York, N. Y. Copies of the Plans and Specifications may be obtained from the Engineers after May 1, 1950, upon payment of ... [illegible]

Any prospective bidder who desires ... [illegible]

Attention of prospective bidders is directed to the fact that ... [illegible]

No Plans and specifications shall be removed by the successful bidder until ... [illegible]

The Department will not be responsible for any ... [illegible]

The Department will not be responsible for any ... [illegible]

All work must be done to the satisfaction of the Engineers and will be subject to inspection by ... [illegible]

All questions will be made only in writing to the Department ... [illegible]

The Department reserves the right to reject any or all proposals ... [illegible]

H. Emerson Smith, Chairman
W. W. Mayo, Director
Delaware Highway Department
Wilmington, Delaware
May 1, 1950

OFFICIAL PROPOSALS

The contract will be awarded to the lowest responsible bidder within twenty (20) days after the opening of proposals. The right is reserved to reject any or all bids.

The plans and specifications and other contract documents may be examined at the office of the Director of Engineering and at the office of the Engineers, Howard, Needles, Tammen & Bergendoff, Kansas City, Missouri, and New York, N. Y. Copies of the plans, specifications and proposal forms may be obtained from the Engineers after May 1, 1950, upon payment of ... [illegible]

Any prospective bidder who desires ... [illegible]

Attention of prospective bidders is directed to the fact that ... [illegible]

No plans and specifications shall be removed by the successful bidder until ... [illegible]

The Department will not be responsible for any ... [illegible]

The Department will not be responsible for any ... [illegible]

All work must be done to the satisfaction of the Engineers and will be subject to inspection by ... [illegible]

All questions will be made only in writing to the Department ... [illegible]

The Department reserves the right to reject any or all proposals ... [illegible]

H. Emerson Smith, Chairman
W. W. Mayo, Director
Delaware Highway Department
Wilmington, Delaware
May 1, 1950

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:
(All words for counted insertion)
$1.20 cents a line, minimum 4 lines. To figure advance payment count 5 average words as a line.
INDIVIDUAL EMPLOYMENT WANTED: undisplayed advertising rate is one-half of above rate, payable in advance.
PROPOSALS: $1.00 a line an insertion.

INFORMATION:
BOX NUMBERS care publication New York, Chicago or San Francisco offices count as 1 line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:
The advertising rate is $11.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches to a page.

E.N.R.

NEW ADVERTISEMENTS received by May 22nd at the New York Office 330 W. 42 St., N. Y. 18, N. Y., will appear in June 1st issue subject to limitation of space available.

POSITIONS VACANT

CIVIL SERVICE

POSITIONS VACANT

(Continued on page 120)

ESTIMATOR

Wanted by established Pittsburgh firm of commercial and industrial contractors. Must have had experience with contractors engaged in similar work. State salary experience and when available. Splendid opportunity for advancement.

P-6396 Engineering News-Record
[illegible] N. Y.

GRAVEL PLANT SUPERINTENDENT

Wanted for operating and managing portable and permanent plants in Indiana and Michigan. State experience, references and salary.

P-6396 Engineering News-Record
[illegible] N. Y.

ENGINEER LICENSED
in New York State
Also Sales-Engineer

Experienced in bridge construction and alterations. Permanent position for right man. Reply stating experience to

P-6396 Engineering News-Record
[illegible] N. Y.

WANTED
PROJECT ENGINEERS
FIELD ENGINEERS

and inspection staff by large, long established engineering organization for long term water development programs in Texas and Oklahoma areas. Supervisory and inspection staff must be experienced on dams, powerhouses, water supply, and irrigation. Vacancies include resident engineers, layout engineers, concrete technicians, field accountants, surveyors, and inspectors. Resident engineers must be college graduates qualified by ample experience to take complete charge of engineering on large contract projects under Chief Engineer. Please submit completely detailed personal education and experience record and salary requirements with first letter. All replies strictly confidential.

P-6413 Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

ENGINEER WANTED

Large Western pulp and paper mill manufacturing kraft, groundwood and sulphite pulp and papers and doing extensive converting, seeks graduate engineer with 15 to 20 years mill experience gained principally in the pulp and paper business. Initial responsibility would be field supervision of maintenance, construction and shops embracing crew of approximately 300 employees. Successful man could work into plant engineering position within 3 to 4 years.

P-6418 Engineering News-Record
[illegible] N. Y.

WHEN *Answering Advertisements*

PLEASE *do not send original letters, certificates or photographs. We cannot be responsible for their return. Please send photostat or carbon copies.*

WANTED

2 Structural detailer–checkers

Permanent jobs for good men with experience in all types of bridge and building work.

Apply by letter, giving resume of experience, also salary desired.

PAXTON & VIERLING IRON WORKS
P.O. BOX 1085 OMAHA, NEB.

ESTIMATOR

WANTED

In Philo., experienced in general heavy construction work. Give information on experience, salary, availability. Experience with contractors preferred.

P-611 Engineering News-Record

CITY OF DETROIT

Detroit Civil Service Commission
1501 Water Board Bldg.
735 Randolph Street, Detroit 26, Mich.

POSITIONS VACANT

(Continued from page 119)

EXPERIENCED ENGINEER to supervise water and sewer construction. Must be experienced in the design and construction of water and sewer systems. Must be capable of handling men and equipment. Permanent position with excellent opportunity for advancement. Reply stating age, experience, and salary desired. Address P-606, Engineering News-Record.

EXPERIENCED ESTIMATOR needed by Utah Manufacturer of Concrete Products. Must be familiar with concrete block and brick construction. Do not apply unless you have had experience in estimating. Write Box 1000, Salt Lake City, Utah.

EXPERIENCED REPRESENTATIVE wanted by reputable manufacturer of concrete products. Must be familiar with concrete block and brick construction. Do not apply unless you have had experience in estimating. Write Box 1000, Salt Lake City, Utah.

SELLING OPPORTUNITY OFFERED

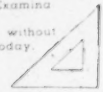
POSITIONS WANTED

STRUCTURAL ENGINEERING

A Course of Instruction by Mail

FOR FORTY YEARS our courses have helped thousands to better positions and to pass State Board Examinations.

Information sent without obligation. Write today.



WILSON ENGINEERING CORP.
College House Offices - Dept. E
Harvard Sq. Cambridge, Mass.

POSITIONS WANTED

EXPERIENCED ENGINEER to supervise water and sewer construction. Must be experienced in the design and construction of water and sewer systems. Must be capable of handling men and equipment. Permanent position with excellent opportunity for advancement. Reply stating age, experience, and salary desired. Address P-606, Engineering News-Record.

EXPERIENCED ESTIMATOR needed by Utah Manufacturer of Concrete Products. Must be familiar with concrete block and brick construction. Do not apply unless you have had experience in estimating. Write Box 1000, Salt Lake City, Utah.

EXPERIENCED REPRESENTATIVE wanted by reputable manufacturer of concrete products. Must be familiar with concrete block and brick construction. Do not apply unless you have had experience in estimating. Write Box 1000, Salt Lake City, Utah.

AVAILABLE, B.S. and E. John Arc 25 years experience in design, construction and supervision of bridges, buildings, dams, etc. Will go anywhere. Address P-607, Engineering News-Record.

ESTIMATOR is ready to go to Boston and vicinity. Has had 15 years experience in building work. Also 5 years as superintendent. Address P-612, Engineering News-Record.

PART TIME WORK WANTED

ENGINEER SKILLED in plant layout, design of steel structures, and mechanical equipment is available for part time work. Registered in Calif. Address P-613, Engineering News-Record.

BUSINESS OPPORTUNITY

For Sale

FOR SALE

In Whole or in Part

FOR SALE OR LEASE

FRITZ AWALT
161 El Camino Rl Berkeley, Calif.
Phone Piedmont 5-0853

Attention Contractors & Builders

Who Are Planning Future Construction

If interested in a well organized efficient group of Engineers & Draftsmen (not hiring of men will be a suitable date to) to assist you in your engineering and we can supply the following:

1—JOB SUPERINTENDENT (Civil Eng.)
1—DRAFTING SUPERVISOR (Mech. Eng.)
1—ELECTRICAL DESIGNER (Elec. Eng.)
1—ELECTRICAL DRAFTSMAN
2—PIPING DESIGNERS
1—ARCHITECTURAL — CONCRETE — STEEL DESIGNER (Civil Eng.)

The above men are licensed & experienced in the engineering area and would be available at a moment's notice. Please write to us in detail, stating salary desired & a brief resume of your experience. Address P-610, Engineering News-Record, 330 West 42nd St., New York 18, N. Y.

WANTED

Grubbing and Clearing That Can Be Done With D 8 Bulldozers.

Write

CARL ERICKSON
PINCONNING, MICHIGAN

SUBMERGED PIPE LINE CONSTRUCTION

BOYCE COMPANY

Phone 3-2530 Clearwater, Fla.

ESTIMATING SERVICE

Any Trade and Type of Project

QUANTITY ANALYSES & APPRAISALS

MATERIAL & LABOR PURCHASE REQUISITIONS

Literature and Sample on request

CONSTRUCTION SURVEY COOPERATIVE

101 Park Ave., New York 17, N. Y.
MUrray Hill 5-7317 Founded 1922

Building Construction Cost Data

1950 (8th) Edition

A 92-page booklet of tabulated construction costs revised as of January 1950. 1500 items alphabetically arranged and broken down for labor and material. Concise. Comprehensive. *Up-to-date, Handy.* $2.50 Postpaid.

R. S. MEANS

P. O. Box 62N Duxbury, Mass.

FOR RENT OR SALE

3 D7 Caterpillar Tractors with dozers. In excellent condition. $3,900.00 each. *Will rent at reasonable rate.*

CLAPP, RILEY and HALL COMPANY
14 North Clinton St., Chicago 6, Ill.
FRanklin 2-4028

PAVER FOR SALE

Ransome 27E single drum paver in good operating condition $3000

METALWELD, INC.
2615 Hunting Park Ave.
Philadelphia 29, Penna.

Distributors of

Thew-Lorain
Cranes and Shovels
Chain Belt
"Rex" Moto-Mixers
Pumpcretes
Adams Graders

BEFORE *your job gets started - call*

EHRBAR

Distributors of

International Harvester Tractors and Power Units
Barber-Greene Bituminous and Material Handling Equipment, Ditchers
Hough Payloaders

"The Distributor with Rebuilding Know How"

CRANES & SHOVELS

Michigan Model T-6 BACKHOE mtd. on 4x4 truck dual rear tires. Single Hercules Gasoline engine. Air controls. In fair condition.

S. & L. CRANE, brand new, 5 ton capacity, 18' boom, double drum. Mounted on solid rubber tires.

LORAIN, Model TL-20 CRAWLER, powered by WAUKESHA gas engine, 30' boom, clamshell equipment and lifting crane equipment. Made in 1948. In excellent condition.

P. & H. Model 600, 1¼ yard CRAWLER Shovel powered by gas engine. Mfg. in 1932. In operating condition.

TRACTORS

ALLIS-CHALMERS, Model HD-7 TRACTOR, 63" tread, canopy, starter, Gar Wood hydraulic bulldozer. Mfg. in 1947. In good condition.

ALLIS-CHALMERS, Model HD-5 Tractor Shovel, Hydraulically operated bucket, starter, cab, 13" shoes. In good condition.

BUCYRUS-ERIE, Model TD-6 DOZER SHOVEL. New in 1946. In very good condition.

CLETRAC, Model HG-31 gasoline Crawler Tractor with electric starter, lights and Anderson bulldozer. New in 1949. In excellent condition.

CLETRAC, Model HG-42 and hydraulic lift snow plow, Gar Wood rear cable winch. In good condition.

CLETRAC, Model DG, 15" shoes, 48" tread, electric starter, crank case guard, with HEIL hydraulic bulldozer. New in 1945. In operating condition.

INTERNATIONAL HARVESTER, Model TD-14, heavy duty front axle with spring, electric starter, muffler, 1 set rear wheel weights. Tires 6.00x20, 8 ply front, 12.00x24 6 ply rear. Trojan bulldozer. New in 1948. In good condition.

INTERNATIONAL HARVESTER, Model TD-6, 50" tread, standard attachments and B-E hydraulic bulldozer. New in 1946. In fair condition.

BUY OF THE MONTH

New MARION, 20 ton capacity, TRUCK CRANE, 80' folding boom, 30' jib. Mounted on DART 10 wheel trailer. BUDA gas engine, CRANE and CARRIER.

INTERNATIONAL HARVESTER, Model TD-14, 74" tread, 18" shoes, standard attachments and ISAACSON hydraulic bulldozer. New chains, rear sprocket, top and bottom rollers. New in 1947. In good condition.

INTERNATIONAL HARVESTER, Model TD-14 with HUGHES-KEENAN ROUSTABOUT crane. New in 1942. In fair condition.

INTERNATIONAL HARVESTER, Model TD-18, 74" tread. With electric starter and lights, standard equipment and ISAACSON hydraulic bulldozer. New in 1947. In good condition.

CONCRETE MIXERS

CMC, Model 7S, End Discharge concrete mixer, complete with skip, no tank, powered by Hercules gas engine, mounted on pneumatic tired wheels. Mfg. in 1940. In operating condition.

JAEGER, Model 11S, End Discharge concrete mixer. Complete with tank, power skip, 4 cyl. WISCONSIN air-cooled gasoline engine. Mounted on 2 pneumatic tires. Mfg. in 1946. In excellent condition.

KWIK-MIX, Model 11S, End Discharge Concrete Mixer. Complete with water tank, power loader, powered by 4 cyl. LE ROI radiator cooled gas engine. Mounted on 2 pneumatic tired wheels. In excellent condition.

REX, Model 11S End Discharge Concrete Mixer, Complete with water tank, power loader, Wisconsin 4 cylinder gas engine. Mounted on 2 pneumatic tired wheels. New in 1947. In good condition.

REX, Model 11S, End Discharge Concrete Mixer, complete with power loader, water tank, 4 cyl. WISCONSIN engine. Mounted on 2 pneumatic tired wheels. New in 1948. In good condition.

REX, Model 16S End Discharge concrete mixer. Complete with power loader, water tank, 4 cyl. WISCONSIN air-cooled gas engine. Mounted on 4 pneumatic tired wheels. New in 1948. In excellent condition.

COMPRESSORS

INGERSOLL-RAND, Model 500, 2 stage Air compressor, WAUKESHA gas engine, clutch, electric starter, 4 solid rubber tires. New in 1939. Good condition.

INGERSOLL-RAND, Model 500, 2 stage Air compressor, WAUKESHA gas engine, clutch, electric starter, 4 pneumatic tires. Also Diesel conversion assembly. New in 1939. Reconditioned.

MISCELLANEOUS

PUMPCRETE, DOUBLE, Model 160, powered by WAUKESHA, 6 cyl. engine with remixer powered by LE ROI gas engine. Few fittings, no pipe. On skids. Made in 1939. In good condition.

HOUGH, Model HLA Payloader with 1 yard 62" hydraulic bucket. Mfg. in 1947. In excellent condition.

HOUGH Model HLD Payloader with 1 yard Hydraulic bucket control and blade. New in 1948. In excellent condition.

HOUGH Model HLD Payloader with 1 yard gravity dump bucket. New in 1946. Operating condition.

CATERPILLAR 22 Grader Tandem rear wheels, leaning front wheels, scarifier. Good condition.

AUSTIN-WESTERN Model 55 Grader with scarifier, 8' hydraulically operated Moldboard. New in 1945. In very good condition.

EXPORT SERVICE **SUBJECT TO PRIOR SALE** **IMMEDIATE DELIVERY**

EHRBAR

SINCE 1903

UNION, N. J. Unionville 2-7400
BROOKLYN, N. Y. Evergreen 3-5000
WESTBURY, L. I. Westbury 7-1990

Weiss Steel Co., Inc.

600 W. Jackson Blvd.
Chicago 6,
Illinois

Phone
CEntral 6-1936

OFFERS

HOT ROLLED DEFORMED REINFORCING BARS INTERMEDIATE GRADE

Item	Tons	Size	Quality
1.	65	½" Rd x25' 30 *	
2.	8	⅝" Rd x25' 30 *	
3.	16	1" Rd x25' 30 *	
4.	17	1¼" Sq x25' 30 *	
5.	18	1½" Sq x25' 30 *	

* 10% shorts to 15

HOT ROLLED ANGLES

6.	125	1"	x1"	x⅛" x16'	20	.30	50 carbon
7.	50	1"	x1"	x⅛" x16'	20	.30	40 carbon
8.	35	1¼"	x1¼"	x⅛" x20'		.30	40 carbon
9.	11	1¼"	x1¼"	x⅛" x20'		.40	50 carbon
10.	26	1¼"	x1¼"	x¼" x16'	20	Mild	
11.	10	1½"	x1½"	x¼" x16'	20	Rail	
12.	11	2"	x2"	x¼" x16'	20	Mild	
13.	19	4"	x3"	x¼" x60'		Mild	

HOT ROLLED STRUCTURAL CHANNELS

14.	20	3"	x4.1	x20'
15.	14	4"	x5.4	x20'

HOT ROLLED MILD STEEL PLATES

16.	40	¼"	x48" x144"
17.	89	½"	x72" x240"
18.	27	Sqs	x48" x112½"
19.	25	¼"	x60" x144"
20.	200	½"	x54" x240"

HOT ROLLED MILD STEEL FLATS

21.	15	½"	x3"	x16' 20'
22.	60	½"	x2"	x16'
23.	10	½"	x2½"	x16'
24.	8	½"	x3½"	x20'
25.	7	½"	x4"	x16'

HOT ROLLED BARS

26.	5	1"	Rd x16'	20'	C-1320
27.	10	1"	Rd x16'	20'	C-1316
28.	10	2"	Rd x16'	20'	C-1316
29.	5	2"	Hex x14'	16'	C-1335
30.	66	2"	Rd x16'	20'	A-4027
31.	15	2½"	Rd x13'	15'	C-1330

For brevity refer to Item No.

"BE WEISS—BUY WEISS"

• STRUCTURAL STEEL SHAPES •

New and Used—Immediate Delivery

At present our inventory of steel shapes and forms includes a full line of both new and used steel especially for heavy construction work. 4" I beam to 36" Girder Beam. 14" Columns 287# 398#

BEARING PILE SECTION

Stock list on request. Write, wire or phone.

HY DRACHMAN STEEL CORPORATION

Warehouse
14-23 34th Ave., Astoria L. I., N. Y.
Astoria 8-8023, 8-4484-5

Sales Office
563 E. Tremont Ave., New York City, N. Y.
Cypress 9-5440-1

FOR SALE

1—No. 56 Pioneer portable crushing plant powered by two D17000 Caterpillar Diesels equipped with 30-inch x 42-inch primary crusher, 24-inch x 54 inch roll crusher and with 40-inch x 12-foot traveling grizzly.

3—Koehring Dumpsters Serial Numbers D-2577, D-2578 and D-2579.

ALL IN EXCELLENT CONDITION
NOW AVAILABLE

Kearney, Crume & Company
3606 Commerce St., Dallas, Texas
Phone Tenneson 3-3783

FOR SALE

1—37 cu. yd., 4 compartment Butler Aggregate Bin complete with 3 beam, 2 cu. yd. scale.

1—450 bbl. Butler Cement Silo complete with scales, unloading screws, etc.

1—Worthington Ransome 2 cu. yd. Concrete Mixer, Model 56S.

This equipment is located in North Georgia and is priced to sell. Practically new; being used approx. 3 months.

ELLARD CONTRACTING COMPANY, INC.
P. O. Box 6705 Birmingham 10, Ala.
Tel. 59-5426

FOR SALE OR RENT
ALL LATE MODELS

1—N.W. Shovel 2½ c.y. Model 80D
1—N.W. Shovel 1½ c. y. Model 6
5—DW 10's—3000 hrs. or less
1—Caterpillar D8 Angledozer
1—Caterpillar D7 Bulldozer

Williams Construction Co.
Box 145, Middle River
Baltimore 20, Md.
Phone—Essex 1310

FROM STOCK—FACTORY-NEW

AMSCO 1¾ cy Dipper for Lorain 80 Shovel
Tread Shoes for Lorain 79
far under factory price

BENDIX MACHINERY CO., INC.
401 Broadway, New York 13. Tel.: Canal 6-5693

LIMA ELECTRIC 1¾ Cu Yd SHOVEL

Good Working Condition

Price $7500.00—Photo on request

Construction Equipment Corporation
11-22 43rd Ave. L. I. City, N. Y.

GRADER & ROLLER
FOR SALE

Allis Chalmers Model AD Tandem tires, fully equipped, diesel.

Huber 5 to 8 ton, Tandem, hydraulic steering, gas.

Both in excellent condition and attractive price.

LOCATED IN OUR YARD

HODGE & HAMMOND, INC.
1162 Grinnell Place, New York, 59, N. Y.
Dayton 9-5300

FOR SALE

Jaeger base stone spreaders—pull type excellent condition. $400.00 f.o.b. our yard.

R. F. KLINE
Frederick, Md. Phone Fred. 550

PUMPCRETES

Rebuilt Current Models
For Sale or Rent

CONCRETE EQUIPMENT COMPANY
312 E. Wisconsin Ave.
Milwaukee 2, Wis.

FOR SALE

1—1½ Cu. Yd. Amsco Shovel bucket, new, complete with teeth and sheave for P & H Shovel. Price $1450.00

Phone Williams 1-8600
Hillsgrove, Rhode Island

FOR SALE

One ½ Yard Trenchoe Attachment for use on UNIT Crane & Shovel Corp. Model 514. New condition.

L. B. SMITH, INC.
357 W. Fayette St. Syracuse 2, N. Y.
Phone 5-2196

New Guaranteed . . . 60 TON
HYDRAULIC JACKS
Navy Surplus
ILLUSTRATED CATALOG **60% off**
BERKELEY DISTRIBUTORS INC.
16 JOHNSON AVE HACKENSACK N J

WANTED—*At Once*
30-Cubic Yard and 50-Cubic Yard
DUMP CARS
W-6009, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

WE BUY OR SELL
All Types of
TRENCHING MACHINES
AIR COMPRESSOR RENTAL CO.
19615 NOTTINGHAM RD. CLEVELAND
Kenmore 1-8000

WANTED
#7 and #9BC McKIERNAN-TERRY
PILE HAMMERS
GOOD CONDITION
State best price, age, serial and location
W-6191, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

FOR RENT:
Lorain #75B and
Byers #104 shovel-cranes
Both are one cubic yard machines and are in good operating condition.
THOMAS C. BROWN CO., INC.
307 Union St. Schenectady 4-0814

FOR RENT
Modern Caterpillar Mounted
CRANE, CLAMSHELL & DRAGLINES
40 to 60 ton Capacity
CLEMENS CONSTRUCTION COMPANY
P. O. Box 266 West New York, N. J.
FRanklin 5-0600

PORTABLE
SUCTION DREDGE
2 Section Steel Hull, 110-150 cu yds.
10"x12" Pump, 275 H.P. Diesel Engine, Etc.
Stephen A. Douglass Co.
630 Ft. Washington Ave.
New York 33, N. Y.

Construction Equipment Priced Right

LOCOMOTIVES

CRANES

GRADERS

ROLLERS

BUCKETS

DERRICKS & HOISTS

MISCELLANEOUS

R. A. PARKINSON & SON
519 N. Delaware Ave. Philadelphia, Pa.

FOR SALE

8 ton modern gasoline dinky	$2,250.00
20 ton Whitcomb gas dinky	3,500.00
Truck mounted Buda Earth Auger, like new, HBG 40	2,500.00
40" 24" belt conveyor with troughing rollers, etc.	500.00

CLAPP, RILEY AND HALL COMPANY
14 North Clinton St. Chicago 6, Ill.
FRanklin 2-4028

U. S. AIR CORPS TYPE
NEW, SAFER, SHOCK RESISTANT
SUN GLASSES
Reduce Eyestrain From Glare & Harmful Rays
Reg. $10.00 Quality
$2.25 Ea. 2 For $4.00
P. Post Paid

MAKE QUICK ACCURATE SIGHTS
•
NEW IMPROVED HAND
SIGHTING LEVEL
COMP. WITH U. S. ARMY PLASTIC POUCH
SPECIAL LOW PRICE $1.85
SHIP. CHG. 15c EXTRA EACH

BE SAFE—BE SURE ON LAND OR SEA
Brand New U. S. Navy
POCKET COMPASS
DEPENDABLE ACCURATE
Has Many Features Not Found on Compasses Many Times This Price
Regular $10.00 Value
$3.00
P. POST PAID

J. JACOB SHANNON & CO.
214 N. 22nd St. Phila. 3, Pa.
The Oldest Equipment House in Phila.

USED LUMBER FOR SALE

300,000 Board Feet of 4x12 and 4x14 attractively priced for quick sale.

This lumber is in excellent condition and is free of all nails.

The lengths run from 16 to 24' with over 80% running from 20 to 24'.

100,000 Board feet of this lot is long leaf yellow pine.

Facilities are available to ship by rail or water to any destination.

Material is located in vicinity of New York.

ES-6019, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

DIESEL ENGINES FOR SALE

2 Venn-Severin 75 HP Diesel Engines

400 RPM. Mfg. in 1938, belted connected to 60 KVA General Electric 3 phase, 50-60 cycle, 220 volt alternators.

Price $1,500.00 ea.

Can be inspected on original foundation under power.

EXCELLENT CONDITION

A. J. WINSTON
517 SOUTH DELAWARE ST.
INDIANAPOLIS 4, INDIANA

Our Craftsmen do
INSTRUMENT REPAIR AND OVERHAUL

- Complete department—handles all makes.
- Experienced craftsmen do all work.
- Includes thorough overhaul, cleaning, oiling and adjustment.
- Precision work guaranteed.

DAVID WHITE COMPANY
317 W. Court St. • Milwaukee 12, Wis.

INSTRUMENTS FOR RENT
We rent transits and levels on a monthly or yearly basis. Reasonable rates. All instruments are fully guaranteed in first class working order.
DAVID WHITE COMPANY
317 W. Court St. • Milwaukee 12, Wis.

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Hydraulically operated Litt Loader can raise a 1,000-lb load to a height of 9 ft 8 in. Dumping can be at any desired height. Mounted at the back, lift cylinder uprights, the lip of the bucket can be brought to a position 42 in. ahead of the front wheels. Spillage is held to a minimum by the quick tilting action of the bucket. Bucket is tripped by a rod connected to a lever at the operator's control panel. When load is discharged, bucket is returned to loading position by tension springs. The Litt Loader can be supplied with attachments for use as a grader, berm leveler, road planer, bulldozer, snow plow, high-way mower, one-way broom, or patch roller.—Bunge Mfg. Co., Marion, Ohio.

Improved Gar-Bro Power-Cart

Three interchangeable trays are featured in the new, improved Gar-Bro Power-Cart. It has a load capacity of 2,000 lb or 1.4 ft³ of bulk materials, travels at speeds to 10 mph, and climbs 20-percent grades with capacity load. The new bulk handling tray is balanced on trunnions at each side. A tuplatch releases the tray and a tilt brake holds it at any pouring angle. Steering and power control are by tiller. Speed is controlled by a foot throttle. Weight of the Power-Cart is 690 lb.—Gar Bro Mfg. Co., 2416 E. 16th St., Los Angeles, Calif.

Reverse-Circulation Drill

Principle of operation of the reverse-circulation Portadrill is that water is allowed to settle in the hole and is drawn up inside drill stem by vacuum action of the gravel pump. Advantages include: Recovered boulders up to four times the size that can be ground into small particles that can be drawn up while through drill stem, and discharged through the pump, since water settles out of its own weight (and without pressure) on outside of drill stem, the tendency for a hole to cave is practically eliminated. Limitation of the principle is one of depth rather than circumference of the hole. Field tests indicate that 60-in. dia holes can be drilled to depths of 100 ft and more. Complete portability is maintained by mounting the entire unit on a 2-axle trailer.—Lee Wheeler Wells Co., 2201 Blake St., Denver 2, Colo.

Scoop for Bulk Materials

Scoop Shovel, accessory for Lift King and Warrener trucks, handles up to 27 ft of material. It tilts upward from horizontal scooping position to cradle load during transport, and tilts downward to completely discharge when dumping. It lifts loads to a height of 150 in.—Yale & Towne Mfg. Co., Philadelphia Division, Roosevelt Blvd. & Hatfield Ave., Philadelphia 15, Pa.

End-Discharge Tilting Mixer

Close coupling of drum power mechanism is feature of the new CMC 34-S end discharge Wonder tilting mixer. Tilting mechanism has a convenient brake and large hand wheel to minimize operator effort and provide control when positioning the balanced drum. Power is provided by an air-cooled gasoline engine.—Construction Machinery Corp., Waterloo, Iowa.

Lift-Gate for Pick-Up Trucks

Hydraulically powered lift gate attaches to any 1-or 2-ton pick-up truck. Operated by two hydraulic hoist cyl-

Continued on page 130

VALVES ARE OPENED AND CLOSED *Automatically*..

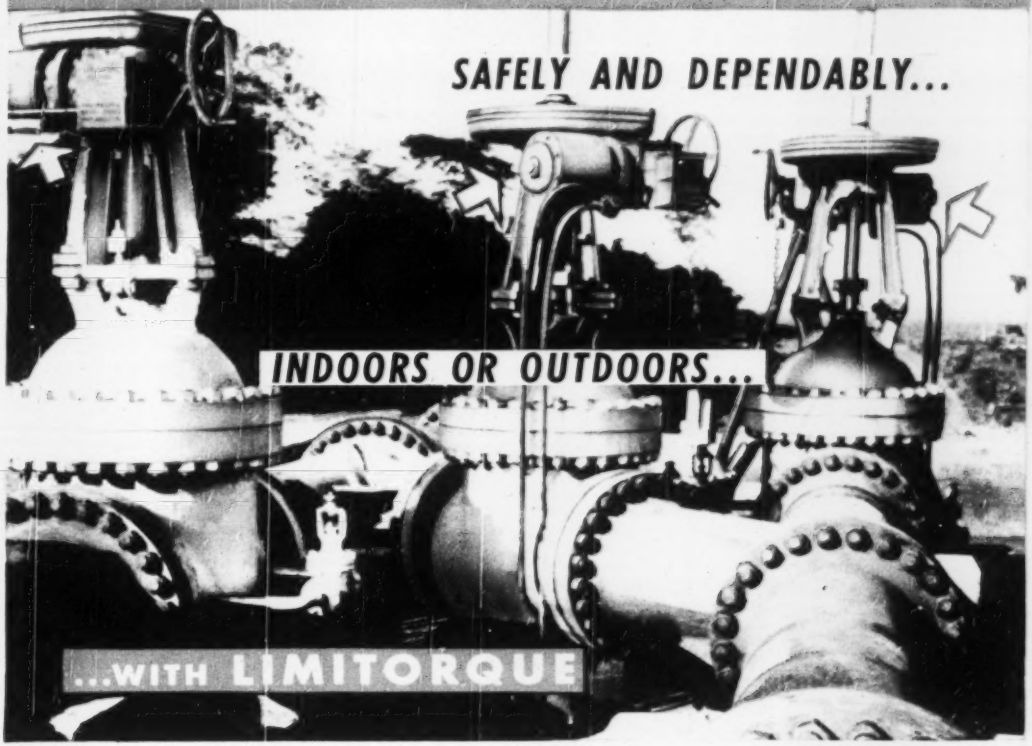

PHOTO COURTESY WALWORTH CO.

The above illustration was taken in far off Venezuela, and shows 3 Electrically Operated *LimiTorque Valve Controls* mounted on 24" cast steel *Walworth* (series 300) *Valves*.

"LIMITORQUE" Operators are used throughout the world, because they operate (at the mere "push of a button") . . . under the most severe conditions of Heat or Cold, Rain, Snow, Dust, Dirt or Fumes . . . night and day . . . year in and year out—"LIMITORQUE" saves time, labor and money by *eliminating manual operation* of valves at distant locations. It opens and closes valves at the speed required, and is *absolutely dependable* and safe. As the name implies, "LIMITORQUE" limits the torque applied to valve operating parts and thus prevents damage to stems, discs and seats, etc.

"LIMITORQUE" utilizes any available power source for operation: electricity, oil, gas, water or air.

Please be sure to use your Business Letterhead when writing for this valuable 96-page illustrated Catalog.

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LimiTorque Valve Controls

SPARLING MAIN-LINE METERS

for CONSISTENT ACCURACY

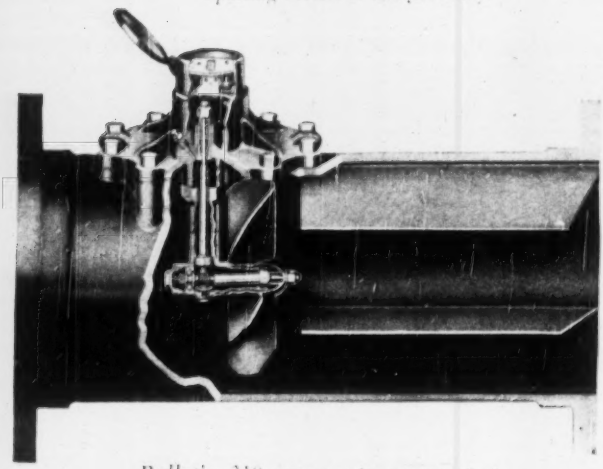
Sparling Meters are guaranteed to register accurately within 2% when properly installed, on all flows within their rated range.

EASE OF INSTALLATION

Sparling Meters are installed as easily as a length of the pipe whose flow they measure.

OVER-ALL ECONOMY

In first cost, ease of installation and maintenance, and long-lasting service, the choice of Sparling Meters is true economy.



Bulletin 310 comes upon request

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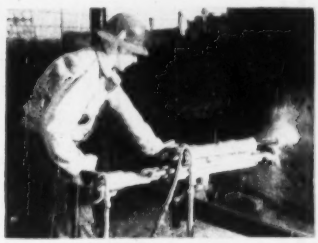
MANUFACTURERS OF THE "CEMENT GUN"

... inders, it will lift loads weighing as much as 800 lb. A single lever controls all operations. The platform automatically stops at ground level. Lift Gate weighs 524 lb. complete.—ANTHONY CO., STREATOR, ILL.

Rubber-Tired Trolley Batcher

Pneumatic-tired wheel and two-bin assembly are latest advancements added to the Le-Bin trolley batcher. This unit is designed with a maximum bin capacity of 50 tons and a low charging height of 9½ ft. With flared extension panels removed, the bins measures 7½ ft in height and hold 8 tons. Trolley batchers can be furnished to handle 2, 3, or 4 aggregates and efficiently serve 16-S, 11-S, and 6-S mixers.—C. S. JOHNSON CO., KOLBRING SUBSIDIARY, CHAMPAIGN, ILL.



Rock-Drill Mountings

Three power-feed mountings are announced for the Thor Model 82 and 92 drifter rock drills. They feature sliding cones which automatically double length of feed. The Model RF-96 has a total extension of 96 in.; the RF-48, 48 in.; and the RF-60, 60 in. An aluminum shell provides light weight.—INDEPENDENT PNEUMATIC TOOL CO., 175 STATE ST., AURORA, ILL.

All-Electric Steam Cleaner

Electrically heated and powered steam cleaner is designed for use where gaseous or explosive mixtures are to be encountered. The Homestead-Yeager unit mixes a constant amount of water with the desired amount of dissolved cleaning compound and pumps the mixture through a manifold where it is heated in progressive stages. At 100 to 1200 lb. normal operating pressure, the boil-

(Continued on page 135)

P&H REMOTE CONTROL — with this unit you can control all functions (even the horn!) by electric push-buttons — from the operator's position inside the crane cab. All changes back and forth between conventional and remote control are instantaneous . . . no mechanical changes required.

P&H TRUCK CRANES

GIVE YOU MORE STABILITY!

How much can you put on the hook? That's the real measure of work-ability in your truck crane. And that's why you'll like P&H Truck Cranes best.

Stability is the answer. And P&H Truck Cranes have it with lower center of gravity — proper weight distribution — the exclusive torsion bar-mounted front axle — more lifting capacity per pound of machine weight.

What's more, P&H Truck Cranes are *dual powered* — not a one-engine compromise. Both engines are designed for their specific jobs — work and travel.

P&H Truck Cranes are convertible for six types of service — crane, clamshell, dragline, shovel, trench hoe and pile driver. Write for literature.

SIZE FOR SIZE NO P&H TRUCK CRANE HAS EVER BEEN OUTLIFTED

Look at these P&H Added Values!

Hydraulic control — a new peak in operating ease and safety.	smoothly and safely, with or without load.
Greater stability — with exclusive torsion bar-mounted front axle and lower center of gravity.	Planetary load lowering — permits "inching" of loads accurately.
Independent planetary boom hoist — raises or lowers crane boom	All-welded construction — greater strength.

Fenders included at standard price.

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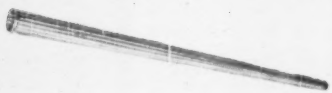
Beauty and Utility

ON A FIRM FOUNDATION WITH

Monotube Piles

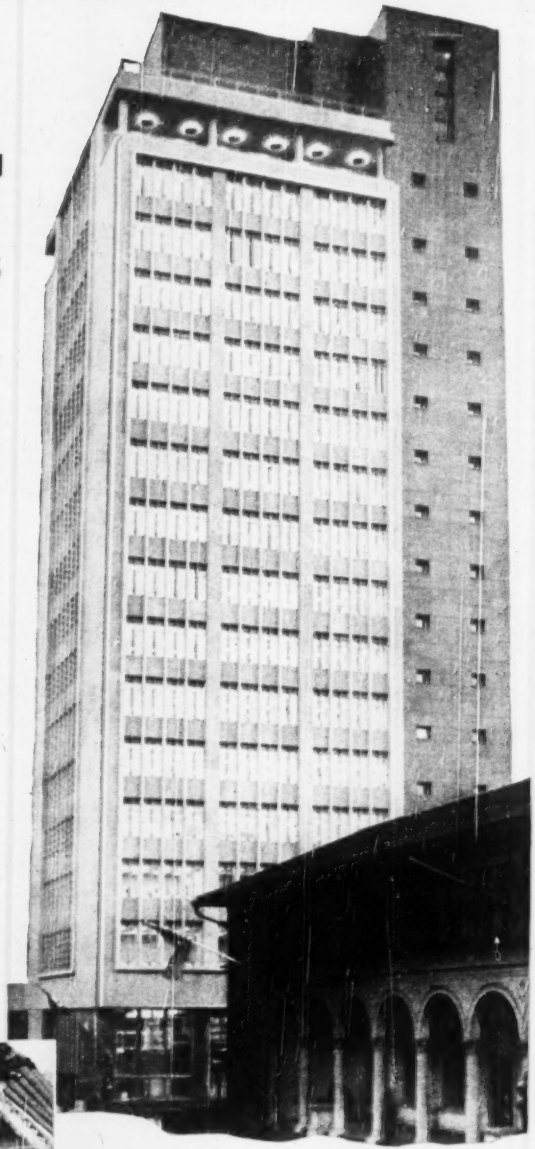


PICTURED here is the beginning and end result of an interesting construction project. The striking, functionally designed structure is one of the most modern office buildings—inside and out—in this country.

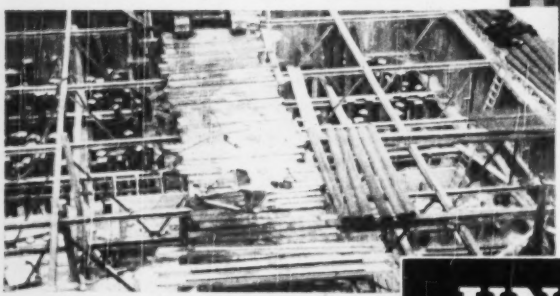
Wise planning went into the foundation of this 18-story building. It included Monotube piles for abundant strength and permanency . . . combined with *practical economy* right from the start.

More and more engineers are turning to the Monotube as a *predictable* pile that leaves no factor to chance. For example, Monotube tapered and fluted design assures measurable advantages in strength, lateral stability, heavy loading and driving . . . benefits that should not be overlooked. Also, Monotubes offer a flexibility of length, gauge, diameter and taper that permits maximum effectiveness *and* economy for varying soil conditions under *all* types of structures.

These are only a few of the important features that you can apply to advantage when you plan with Monotubes. For complete, specific data, write The Union Metal Manufacturing Company, Canton 5, Ohio.



• *Ultra-modern 18-story office building of the Waterman Steamship Corp., Mobile, Ala. (Engineers and General Contractors: J. P. Lucia, Inc.; Consulting Engineer: R. S. Christiansen; Architects: Platt, Roberts & Co.)*

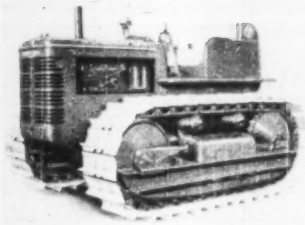


• *Foundation under way, showing use of some 480, 7 gauge Monotube piles, 25 and 30 feet in length.*

UNION METAL

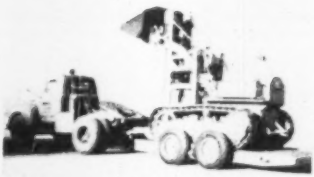
Monotube Foundation Piles

ing hot solution and vapor is exerted from the cleaning gun in 60 gal per-hr blasts. Units are available for 220-v power circuit, and have a demand of 30 kw.—Homestead Valve Mfg. Co., Coraopolis, Pa.



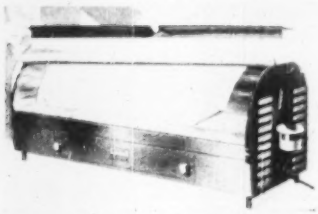
Improved TD-9 Tractor

Higher power performance rating for the International TD-9 diesel crawler tractor include: Drawbar horsepower is upped from 35.88 to 40.85; horsepower at the flywheel is 51.5; an increase of 2.2; belt horsepower from 45.04 to 48.85. Maximum drawbar pull in 1st gear (engine operating at maximum torque) is 11,400 lb, an increase of 1,250. Travel speeds are unchanged.—International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.



Low-Slung Tilting Trailer

Tilting platform trailer measures 16 in. from ground to platform permitting a high degree of clearance for low viaducts, telephone wires, and other obstructions. Dr. Martin 733 Carry-Load has a 6-in. center of gravity and a level, tilt at incline.—Myers Machine Co., Kewanee, Ill.



Lightweight Whiteprinter

Spec-Dry Whiteprinter prints and dries single 24-in. wide sheet. It uses no chemicals or ammonia; dry process produces positive reading white prints, negative black-on-white or

(Continued on next page)

New Powerful Heavy Duty

8½" MallSaw

Weighs Only 12 Lbs. For Right or Left Sawing

A standout for price, power performance, convenience, this new light weight MallSaw cuts everything from wood to steel. It makes straight cuts from 11/16" to 4", 45 degree bevel cuts to 1-11/16". Blades are available for dadoing, grooving tile, transite, concrete, cutting light gauge metals.

Choice of right or left blade, 115V or 230V AC-DC motor. $66.45 without bevel shoe attachment. Other models with 2" to 4½" capacities.

82 Factory Owned Service Stations from Coast to Coast give quick, dependable repair service. Over 1000 Mall Gasoline Engine, Electric and Pneumatic Power Tools for a million jobs. A dealer in every town can supply you.

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IMPROVED OWENS DIG for

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Long experience and intensified experimentation has enabled Owen engineers to originate designs, utilize special alloys and develop methods of manufacture that reduce weight, increase strength and provide greater wear resisting qualities.

"Owen Clamshell Buckets Insure a Bigger Day's Work."

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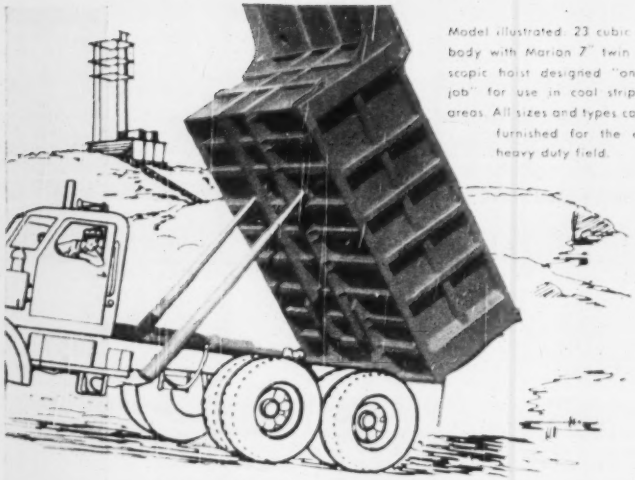

Model illustrated: 23 cubic yard body with Marion 7" twin telescopic hoist designed "on the job" for use in coal stripping areas. All sizes and types can be furnished for the extra heavy duty field.

When The Job Is Extra Tough
Marion "On The Job" Design
Pays Extra Dividends

When extra heavy loads cause unusual strain, Marion Telescopic Hoists really pay off . . . in extra performance, better flexibility and longer life. That's because each Marion unit is designed under actual day-by-day work conditions . . . with special features "built in" for the particular job. Check the advantages of a Marion Telescopic Hoist designed "on the job" for your extra heavy duty hauling.

MARION BODIES AND HOISTS

GET MORE DETAILS NOW
Just mail a post card or letter for the complete Marion catalog, or ask your Marion Distributor.

MARION METAL PRODUCTS CO., MARION, OHIO

McKIERNAN-TERRY JOB-PROVEN PILE HAMMERS

McKiernan-Terry Pile Hammers are job-proved and time-tested . . . the choice of engineers and contractors on major construction projects throughout the world. Available in a standardized line of 10 double-acting hammers, 5 single-acting hammers and 2 double-acting extractors. Write for free Bulletin.

Also builders of coal and ore bridges, bulk material unloaders, bridge operating mechanisms, hoists and marine equipment, and specially designed machinery.

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Engineers—Fabricators
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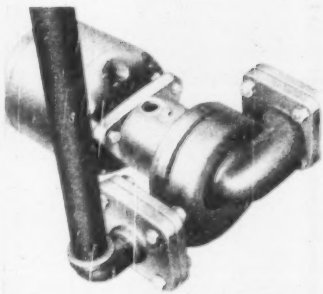
Structural Steel
BRIDGES and BUILDINGS

General Office and Shops
PHOENIXVILLE, PA.

Subsidiary—Barium Steel Corporation

blue-on-white positive prints from transparencies or opaque originals. The Spec-Dee operates on 110-v ac circuits, and has a net weight of 58 lb.—Peck & Harvey, 5756 N. Western Ave., Chicago 45, Ill.



Circulating Pump

Hot water circulating pump is available in sizes from 1 through 2½ in. Features include: Heavy-duty-type mechanical seal; smooth and quiet operation by use of molded-rubber shaft coupling; and can be installed in either vertical or horizontal position. The pumps are especially adapted for panel and radiant heating and circulating hot water in large buildings.—Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

New Product Briefs

Half-pint self-pressure torch for gasoline or alcohol fueling features a built-in soldering-iron rest and windshield. Maker: Turner Brass Works, Sycamore, Ill.

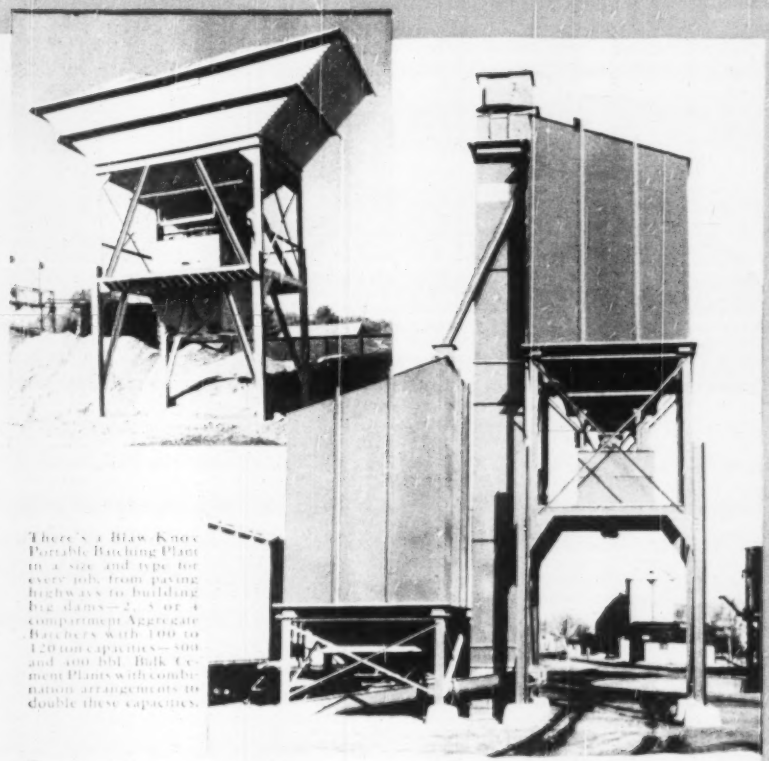
Engine-driven arc welder and power plant is available as stationary or portable unit. For welding, unit handles all ac or ac-dc electrodes from ⅛ to ⅝ in. It delivers 200 amps of welding current. For power, machine provides 3 kw of 110-220-v, ac 60-cycle single-phase current. Maker: Miller Electric Mfg. Co., Appleton, Wis.

Floor magnet has low clearance handle to permit picking up chips from under low obstructions without stooping. The Magnetool is unloaded by means of a neoprene wiper ring which pushes parts to a non-magnetic area at either end. Maker: Multimatic Mfg. Co., Detroit 7, Mich.

Power-operated hoist and follower plate adapted for use with a materials pump, handles materials that will not seek their own level. Maker: Alemite Division of Stewart-Warner Corp.

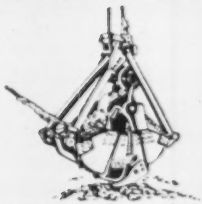
BLAW-KNOX EQUIPMENT

earns More Profit



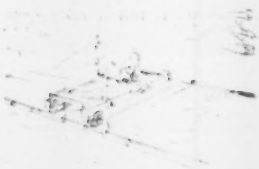
There's a Blaw-Knox Portable Batching Plant in a size and type for every job, from paving highways to building big dams—2-, 3- or 4-compartment Aggregate Batchers with 100 to 120 cu. yd. capacities—800 and 400 bbl. Bulk Cement Plants with combination arrangements to double these capacities.

STEADY consistent production at lowest possible cost—that's Blaw-Knox performance that earns you profit on every construction job. Whatever your job—building big dams or bridges, small sewers or culverts, paving super-highways or Main Street—it will pay you to put your operations on a cost-cutting assembly-line basis with the Blaw-Knox "Complete Package" of construction equipment. It contains everything you need to solve your concrete problems, from material handling to finished slab, and includes Paving Forms, Subgraders, Central Mixing Plants and the Hi-Boy Trukmixer in addition to the equipment shown here. Write for complete details or see your nearest Blaw-Knox distributor.



CLAMSHELL BUCKETS in a wide range of types and sizes for rehandling, trenching, dredging or hard digging.

CONCRETE BUCKETS speed work, cut concrete pouring costs. Built to handle huge quantities of low slump concrete.



FINISHING MACHINES assure highest quality of finish of concrete pavement regardless of the type of concrete mix specified or required.

CONCRETE PAVING SPREADERS automatically spread harsh, dry mixes of two 34 E dual drum pavers no matter where the concrete is placed on the subgrade.

STEEL CURB AND GUTTER FORMS, a complete form system for every curb, curb and gutter, integral curb, special curb and sidewalk job.

BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX CO., Farmers Bank Bldg., Pittsburgh 22, Pa.

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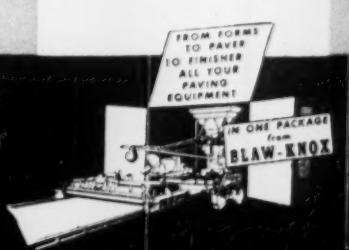
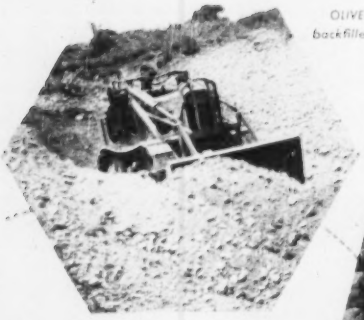


OLIVER HG Crawler Tractor with Ware backfiller blade attached to shovel arms.

OLIVER HG Crawler Tractor with Ware Loader loading sand into truck.



OLIVER Model "88" Wheel Tractor with Ware Boom handling cast iron pipe.

...take the "Load" out of Your Loading Problems!

OLIVER Model "88" Wheel Tractor and Ware Loader loading out gravel.

Whatever your loading problem, the easy, economical answer is an Oliver Crawler Tractor or Oliver Industrial Wheel Tractor and Ware Front-End Loader.

These powerful tractors and the hydraulically operated loaders are easy to operate . . . easy on maintenance and operating costs. Lift and bucket are hydraulically controlled. Hydraulic control of bucket assures greater breaking-out action and full loads . . . prevents wasteful spillage. "Midsection" pivot allows longer reach of dumping position and distributes the weight advantageously over the tractor frame to minimize strain. The hydraulic rams are designed to take most of the shock loads, assuring longer life for both tractor and loader.

And, the tractor-loader unit can be quickly converted to backfiller, boom or lifting fork. Special buckets are available for coal, snow or humus loading. The hydraulic system can be used to power other equipment such as mowers, sweepers, etc., in combination with the loader. For all the facts, see your local Oliver Industrial Distributor, or write direct to:

OLIVER HG Crawler Tractor with Ware Loader on ditching job.

THE OLIVER CORPORATION

Industrial Division · 19300 Euclid Avenue · Cleveland 17, Ohio

A complete line of Industrial Wheel and Crawler Tractors

"THE SIGN OF EXTRA SERVICE"

Manufacturers' Publications

Bottom-Dump Wagon — Features of the improved Model EDT bottom-dump Euclids are illustrated and described in Catalog 250. Features listed include: Easy loading, good traction and flotation, short turns, fast dumping, maximum driver comfort, and heavy-duty construction. Text, accompanied by large photographs, is used to describe principal features of component parts, with particular emphasis on special Euclid features. The Euclid Road Machinery Co., Charles Road, Cleveland 17, Ohio.

Welding Catalogs — Eutectic has made available four catalogs on welding techniques and alloys. Form EUD lists aspects of the welding stainless steel with Stoodroles. It is illustrated with scribed case histories. Vol. 6, No. 7—56-p brochure lists 15 case histories of production welding techniques. Form EU-31 describes developments in aluminum welding metal brazes with Eutectrod 100. And Bulletin EUD describes the super-fast Hand Omatic electrode for steel. Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.

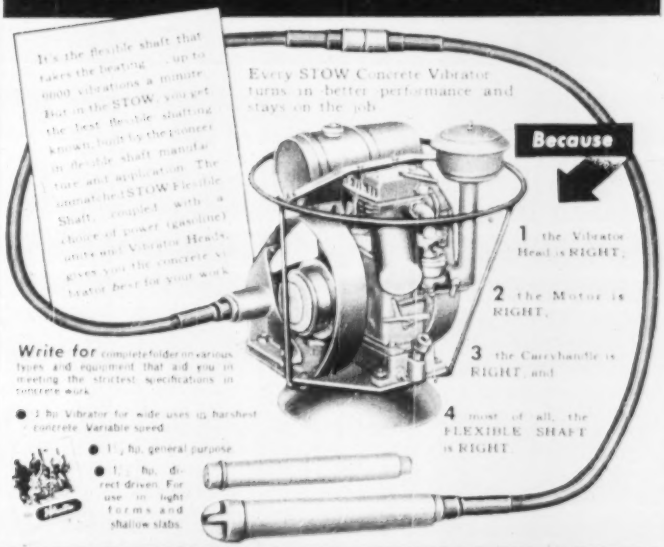
Sheet-Metal Closures — Corrugated closures for sheet-metal buildings are listed in Bulletin 501. The bulletin lists sizes and specifications of the Fabco closures, and shows, by drawings, applications of the product to most types of corrugated building assemblies. Fabco-Veco Products Co., Box 8065, Pittsburgh 16, Pa.

Valve-Sizing Charts — Liquid and gas valve-sizing charts cover the ranges 0.02 to 10,000 gpm and 1 to 10,000 lb per hr. The liquid valve-sizing chart takes into account difference between pressure drop across valve and across valve ports alone, liquid viscosity, and specific gravity in determining port area and valve size. The gas valve-sizing chart takes into account inlet and outlet absolute pressures, specific gravity, and temperature. Fischer & Porter Co., Dept. 7007, Hatboro, Pa.

Synchronous Motors, Generators — Bulletin GEA-5415-S 8-ppl describes the Cled high-speed synchronous generators for use as standby portable or prime power sources. Units with ratings from 124 kva to 1,250 kva and speeds from 1,800 rpm to 514 rpm are

Continued on next page

STOW CONCRETE VIBRATORS
For a Better Job . . . and EASIER, LONGER USE


It's the flexible shaft that takes the beating . . . up to 9000 vibrations a minute. But in the STOW, you get the best flexible shafting known, built by the pioneer in flexible shaft manufacture and application. The original the STOW Flexible Shaft . . . complet with a choice of power (gasoline) units and Vibrator Heads, gives you the concrete vibrator best for your work.
Every STOW Concrete Vibrator turns in better performance and stays on the job
Because
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2 the Motor is RIGHT,
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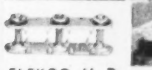

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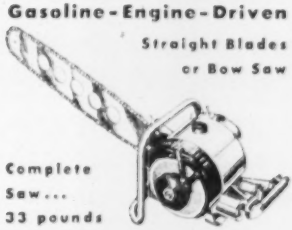

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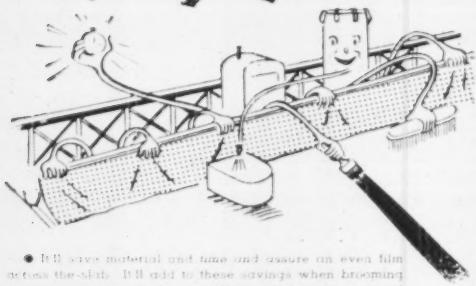

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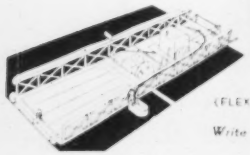

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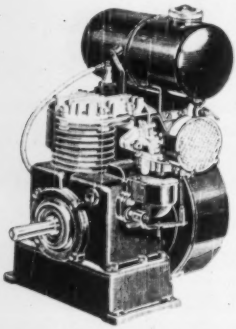

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covered. Bulletin GEA 5332 (8 pp.) illustrates typical installations of low-speed synchronous motors. Covered are Type TS (3 phase) and Type QS (2 phase) motors in the 6000 series with frame sizes of 6184 and larger and ratings from 200 to 15,000 hp. — General Electric Co., Apparatus News Bureau, Schenectady 5, N. Y.

Joist and Column Forms—Removable steel forms for concrete joists and round columns are described in bulletin. In addition to describing construction and operation of the Hunsman forms, the bulletin contains several illustrations (with job data) of typical buildings which have been built using them.—The Hunsman Steel Co., P. O. Box 316, Toledo 1, Ohio.

Earth-Boring Equipment—Horizontal, directional earth boring equipment for all types of construction is described in this 4-pager. The bulletin lists the features of the KeMo equipment, shows several illustrations of it in use, and lists complete specifications for the component parts. Information is also provided on the operation of the drill.—KeMo Tools, Inc., 2121 S. Troy, Chicago, Ill.

Open-Steel Flooring—Bulletin lists several types of open-steel flooring including forged and welded rectangular patterns and triangular reticulated patterns. The bulletin also lists dimensions of each design of grating and safety step and includes a safe load table.—Kerlow Steel Flooring Co., Dept. 10, 21 Mallory Ave., Jersey City 5, N. J.

Valve-Selection Chart—Reducing-valve selection chart is useful to anyone specifying valves occasionally and who does not have all the engineering background necessary to do the job easily. Used in conjunction with Bulletin 148, the chart helps determine proper sizes of valves according to type of service intended, reduced pressure limits, and other factors not simply by pipe size alone.—Keliher Valves, Inc., Div. Hamilton Thomas Corp., Hamilton, Ohio.

Wood-Frame School Construction—Advantages of wood-frame construction for school buildings are shown in pictorial brochure entitled "School Buildings Your Tax Dollars Can Afford." Form of presentation is non-technical with photos and authentic data. The economy of this type of construction is listed in tables of comparative costs.—Timber Engineering Co., 1319 Eighteenth St., N. W., Washington 6, D. C.

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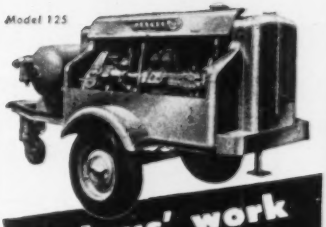

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Letter from . . .

DETROIT

TRANSPORTATION is Detroit's No. 1 problem and headache. You learn that whether you're talking to the air traveler who finds it takes over an hour to get downtown from Willow Run Airport, to the motorist who finds expressway construction is mighty slow and downtown parking space at a premium, or to the commuter who grumbles at the service on some of the surface lines.

But there are engineers of vision and courage in Detroit, determined to make this bustling city one whose 2,000,000 inhabitants can get where they want to go in the least possible time, and with relative ease and comfort. Others, equally progressive, are developing a civic center.

• **Wayne County Airport**—This $14,000,000 project is expected to be completed in 1952. Claimed to be second only to Idlewild Airport in operational capacity, its 6-runway, 3-directional open parallel layout will handle 240 normal plane movements per hour. Its chief bid for attracting commercial passenger airlines away from Willow Run: It will be only 35 minutes driving time from downtown Detroit when the John C. Lodge and Edsel Ford Expressways are completed.

Located on a 2,220-acre site just off the Detroit Industrial Expressway, the airport already has three 200-ft runways—7,950, 7,000, and 5,000 ft long. Lyon C. Smith, airport manager who is also county highway engineer, says a fourth (7,000x200 ft) will be finished this year, complete with ILS and GCA landing aids.

• **Expressways?**—Detroiters are not backward about progress on either the east-west Edsel Ford Expressway or the north-south John C. Lodge Expressway. The big problem is money. Only $10,000,000 (50% federal and 25% each by the state and Wayne County) is available each year for both. This means that the equivalent of about one mile can be built each year.

Sections will be used as completed, but large-scale benefits will not be noticeable until the first leg of each is completed. These include 5½ mi of the Ford expressway, 5½ mi of the Lodge expressway, and a $6,000,000 interchange.

At the present rate of construction, curbstone estimates are that the interchange and this first 9 mi of expressways won't be done until 1954—that it will be 1960 before both are finished. Best guess is that State Highway Engineer Harry Coons, City Engineer George Thompson, County Engineer Smith and others soon will come up with a workable plan for accelerating this program. Additional funds may be raised by bonds or an RFC loan.

• **Civic Center**—Added impetus was given Detroit's $50,000,000 Civic Center development the other day by two events: (1) Ford Motor Co. and its dealers gave $2,500,000 for a 3,400-seat civic auditorium, and (2) a $600,000 architectural contract was executed for a 14-story, $15,000,000 City-County building.

Detroit has been dreaming of a civic center for nearly 50 years. These dreams crystallized in 1944 when a 58-acre site was chosen at the foot of Woodward Ave. along the Detroit River. Last unit in Albert Kahn's $2,500,000 Veterans' Memorial was started in 1948.

• **Mass transportation**—There's nothing wrong with Detroit's mass transportation problem that a two-cent increase in its 13-cent fare couldn't cure. The Detroit Street Railway has been losing $500,000 a month since January. Its bus and streetcar operators have been threatening to strike for more benefits, yet no one favors fare boosts.

• **Off-street parking**—Closely allied with the transportation problem is that of downtown off-street parking. There is a current deficiency of 0,000 off-street parking spaces and John H. Gillis, director of Detroit's parking authority, believes the situation may worsen as new buildings go up on sites formerly used for parking. Both private interests and city's Parking Authority are attacking this problem.

One large department store is building a 5-story ramp-type garage to accommodate 850 cars, replacing an old 2-story structure with 300 parking spaces. Another company recently opened a ramp-type deck structure that can park 250 cars.

The city proposes a 750-car parking structure near the city hall, and hopes to provide parking space eventually for about 2,500 cars at its civic center. But if all this becomes real, the problem will still be far from solved.

• **Other public works**—"$5,000,000 worth of street resurfacing and repair are needed but limited funds will permit only $1,800,000 worth being done this year," according to Glenn Richards, superintendent of public works. . . . nearly $50,000,000 worth of combined sewers completed during the past two years, and $10,000,000 worth of storm water sewers to be started soon for relief of the east side of the city. . . . about 5,000 garbage grinders in use today and 100 being installed in private homes per month. . . . new sanitary ordinance prohibiting open receptacles for rubbish will help eliminate rats. . . . the city wants to clear some of its slum areas and sell the land to private interests to encourage more private housing. . . . 5,800 public housing units to be started this year on three sites approved by the city council. . . . a new 40,000-kw unit has just been added to the municipal steam power plant, boosting its total capacity to 120,000 kw. . . . the Water Board's $33,000,000 water supply improvement program is going ahead under full steam, with completion scheduled for 1957. . . . the Regional Planning Commission is studying long-range plans for pollution abatement.

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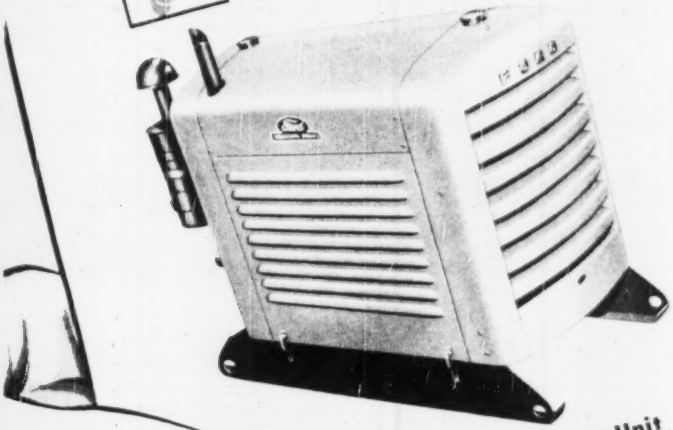

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